ENERGY AND ECONOMIC DEVELOPMENT IN THE SOUTHEAST

PREPARED FOR:

THE ENERGY FOUNDATION

PREPARED BY:

THE GEORGIA TECH ENTERPRISE INNOVATION INSTITUTE

IN PARTNERSHIP WITH THE SOUTHERN GROWTH POLICIES BOARD

LEIGH HOPKINS, AICP
JAN YOUTIE, PH.D.
NANCY GALEWSKI

SEPTEMBER 2010

ACKNOWLEDGEMENTS

The project team would like to extend a special thanks to the following individuals, whom without their expertise; this report could not have been made possible:

Dr. Marilyn Brown *- Professor, School of Public Policy, Georgia Institute of Technology*
Dr. Shari Garmise *- International Economic Development Council*
Dr. Nancey Green-Leigh *- Professor, City and Regional Planning, Georgia Institute of Technology*
Elizabeth Thorstensen *- International Economic Development Council*

ABOUT THIS REPORT

The Georgia Institute of Technology (Georgia Tech) – via the Enterprise Innovation Institute (EI^2), the School of Public Policy and the School of City and Regional Planning - and the Southern Growth Policies Board (Southern Growth) partnered to assist The Energy Foundation in better understanding the impact of state and federal energy policies in the Southeast, and their relationship to economic development. The overall objective of this project was to develop a knowledge base of clean energy policies, economic development policies and outcomes, and relevant stakeholders, and, to provide recommendations for potential action. Specifically, this report inventoried policies and analyzed the impact of clean energy policy – including renewable energy and energy efficiency –in the context of economic development approaches and outcomes.

EXECUTIVE SUMMARY

The Southeast has undergone dramatic economic growth over the last 60 years. While many diverse energy-related policies exist across the Southern states, the region frequently lacks implementation of, for example, renewable portfolio standards, public funds for clean energy, and other clean energy regulations, according to the US Environmental Protection Agency's (US EPA) State and Local Climate and Energy Program. The aim of this project is to bridge the economic growth goals of the region and renewable and energy efficiency policy and program areas.

This sub-report (1) identifies economic development strategies and outcomes that are relevant to the region's economic growth aspirations, (2) identifies existing policy and program areas in renewable energy and efficiency, and (3) makes the link between these policy and program areas and analogous economic development strategies and outcomes. A fourth aspect, engaging the distinctive structure of stakeholders in the Southeast, is addressed in a separate sub-report.

This report is broken up into the following three sections:

Section 1. Economic Development Strategies and Outcomes. In this section, three types of economic development strategies are described: 1) traditional economic development incentives and policies that have driven other high-tech and emerging industries; 2) entrepreneurship and existing industry promotion; and 3) regional innovation clusters. The primary source for this information is a review of key literature on economic development outcomes in each of the three strategic areas.

Section 2. Policy Inventory of Energy Investment Drivers. This section provides a summary and inventory of energy-related policies in seven broad categories: 1) Building Codes and Standards; 2) Renewables and Net Metering; 3) Tax Credits and Rebates; 4) Renewable Portfolio Standards and Energy Efficiency Resource Standards; 5) Loan and Grant Programs; 6) Capital, Equipment, and Property Incentives; and 7) Transportation. Gaps in the adoption of these policies are noted. The primary data sources for this section include the Database of State Incentives for Renewable Energy (DSIRE) database developed by North Carolina State University, and the 2009 Southern States Energy Board (SSEB) legislative digest.

Section 3. Economic Impacts from Green Energy Policies and Programs. The policy areas profiled in Section 2 are compared and contrasted with the types of likely outcomes that can be expected from economic development programs and policies in Section 1. Because of the relative novel nature of the current round of renewable and energy efficiency policy and program areas, there is not a long body of verified research on economic development outcomes from these types of energy-related policy and program areas, aside from the generalization of results from standardized input-output models. Thus, we will present the types of outcomes that could be expected for renewable and energy efficiency policy and program areas based on generalizing from analogous economic development policy and program areas.

SECTION 1. ECONOMIC DEVELOPMENT STRATEGIES AND OUTCOMES

In this section, we discuss the kinds of economic development outcomes from various policies and program areas that are analogous to those in the renewable and energy efficiency domains. For many of these types of economic development programs, there is a long history of replicable evaluation studies. A synoptic review of the results of these studies will give the Energy Foundation an understanding of the types of outcomes that may be expected from similar types of policies and program areas in the renewable energy and efficiency domain.

We present these economic development programs using the framework of the economic development waves or "paradigms." The economic development field has seen the emergence of three overlapping paradigms of professional practice since the first half of the twentieth century. These paradigms differ according to when significant expansions of tools and strategies occurred as the environment in which economic development became more challenging, more sophisticated and more global. Best economic development practice involves the use of all these tools in a synergistic manner, so these tools should not be thought of as independent approaches. Rather, they are described as such to facilitate explanatory description and because they share common characteristics with respect to studies of economic development outcomes. Although some have identified as many as five strategies that are in use in economic development practice,[1] for purposes of this report we will focus on the following three paradigms: (1) incentive-based competition for out-of-area business, (2) promotion of entrepreneurship and existing industries, and (3) regional innovation cluster development.

PARADIGM 1: COMPETITION FOR BUSINESS LOCATION

The first paradigm emphasizes the attraction of facilities of large out-of-area companies. The typical strategy involves offering to a large out-of-area business incentives such as reduced taxes to situate their facility in the jurisdiction. First paradigm strategies grew in prominence in the first half of the twentieth century, and were a lead strategy particularly in the South where states and many localities offered low-costs, infrastructural improvements and other incentives to attract industrial branch plants.[2] This strategy still remains prominent across the country, especially in the South, and is applied both to traditional as well as high technology economic development. One study estimates that 15,000 economic development organizations are engaged in attracting 1,500 facility relocations in a typical year.[3] The usual process of first paradigm strategies is to respond to inquiries from site location consultants, who narrow the list of candidate sites through subsequent rounds of analysis. Customized tax, training, and other types of credits and incentives come into the decision process for those sites

[1] See Blakely E. and Green Leigh, N. (2009). Planning Local Economic Development, Theory and Practice. Thousand Oaks, CA: Sage define a fourth paradigm oriented toward sustainable economic development and a fifth paradigm focused on market-based metropolitan area initiatives. We have not presented these additional paradigms because, due to their relative recency, these paradigms have less information about outcomes.

[2] JC Cobb, (1993). The selling of the South: the Southern crusade for industrial development, 1936-1990. University of Illinois Press.

[3] Levine, T. (2002). Six revolutions in economic development marketing. *The IEDC Economic Development Journal, 1*(1), 5-12.

that make it to the final round. The final decision often is based on a number of tangible factors, such as the ability to get the facility in operation rapidly and at established profit levels, as well as intangible factors that can be idiosyncratic.[4]

There have been a number of studies on the impact of tax incentives on various economic development outcome measures, such as employment or investment. Some of these impact studies use aggregate measures (up to the state level) of outcomes and other factors to assess the impacts of tax policy. Other impact studies assess the impact of tax policy at the micro or firm-level. The results of these studies suggest that the effects of tax cuts or credits to incentive job or investment growth have been modest. A 10% tax cut results in about a 1% to 6% gain in outcomes such as employment, according to most of these studies, with a 2% to 3% gain in employment being most commonly found.[5]

These modest findings lead to questions about whether increases in economic activity would make up for what could be notable decreases in business tax revenues in the context of greater government service impacts.[6] Moreover, some communities find that out-of-area facilities have left before the full payback to the community has been obtained. Consequently, efforts have been made in some places to attach "clawback" provisions to financial incentives. Clawback provisions contractually require payback of some or all of the incentive-based financing that a region gives to a company if certain socially beneficial targets such as new jobs created have not been reached. The use of clawback provisions nearly doubled from 1992 to 2002. However, some economic developers are wary of using clawback provisions lest the target company considers them too burdensome and consequently views the incentive to be less attractive than that of the competition.[7]

In addition, many high tech firms in emerging industries indicate that characteristics such as education and work force attributes, are as important if not more so than financial incentives in their locational decision-making process. For example, in the biotech industry, the strongest factor that states have for supporting development of the industry are public initiatives emanating from higher education. In a report on the development potential for Georgia's biotech industry, it was found that biotech firms had a preference for locations with cooperative academic environments, presence of other biotech firms (for peer support), and greater government support; in the form of tax incentives, sales tax reductions for research and development (R&D) uses, and exemptions for equipment purchases, for the industry.[8] In sum, incentives play a role in the locational decisions of businesses, but they are not the only way to foster economic development.

[4]Bartik, T. (2009). What Works in State Economic Development? Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

[5]Bartik, T. (1991). Who Benefits From State and Local Economic Development Policies? Kalamazoo, MI: W.E. Upjohn Institute for Employment Research. M. Wasylenko (1997). Taxation and Economic Development: The State of the Economic Literature. New England Economic Review. March/April, 37-52.

[6] See for example, the local fiscal impact analysis software application, LOCI™, webloci.innovate.gatech.edu

[7]Bartik, T. (1991). Solving the Problems of Economic Development Incentives. pp. 103-140 in Ann Markusen. (ed.), Reining in the Competition for Capital. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

[8] The Economic Development Potential of Georgia's Biotechnology Industry," August 2000 to February2001. Georgia Department of Industry, Trade, and Tourism and Georgia Tech Economic Development Research Program. Principal Investigator, Joy Wilkins, co-investigator. National and Georgia analysis of biotechnology industry.

Many states are recruiting renewable energy companies based on their natural assets. The state of Texas is a leading example of the use of renewable portfolio standards (see Section 2) combined with state property, franchise, corporate, and production tax credits and exemptions. These states look for a relationship between recruitment targets, state assets, including energy assets such as wind energy in Texas, and economic development goals. These strategies if used responsibly can help create anchors for the development of renewable energy industries.

PARADIGM 2: PROMOTION OF ENTREPRENEURSHIP AND EXISTING INDUSTRIES

In the 1970s and 1980s, a second paradigm appeared, with an orientation toward indigenous small business creation and high-tech start-ups. To qualify as a "small business" for most SBA programs, small business size standards define the maximum size that a firm, including all of its affiliates, may be. A size standard is usually stated in number of employees or average annual receipts. SBA has established two widely used size standards—500 employees for most manufacturing and mining industries, and $7 million in average annual receipts for most nonmanufacturing industries. While there are many exceptions, these are the primary size standards by industry.[9] The spread of this model was aided by research proposing that small firms were major sources of new jobs, and that successful cities and regions would be those with good capabilities to originate new small business or to retain existing businesses. [10]

U.S. Manufacturing Extension Partnership (MEP) Program

Indeed, recent research by the U.S. Small Business Administration (SBA) suggests that startups are a key determinant in a state's economic success. The SBA's researchers found that raising the number of small-business startups by 5 percent tended to boost gross state product by 0.465 percent, increase a state's employment growth by 0.435 percent and raise personal income by 0.405 percent. Based on the median number of small-business startups across all 50 states per year, a 5 percent increase was equal to roughly 445 new small businesses.[11] These results prompted new efforts to incubate small firms and spin-off university start-up ventures in many US states and cities. It also stimulated programs to assist existing small- and medium-sized enterprises such as the U.S. Manufacturing Extension Partnership (MEP). The MEP uses a cadre of industrial specialists in decentralized locations to help small and medium-sized manufacturers adopt current manufacturing technologies and practices, although the MEP is increasingly moving into the provision of innovation-oriented assistance. Many of the services that MEP center's offer – such as lean manufacturing and waste minimization, environmental assistance, and energy efficiency audits – have a direct bearing on the path to sustainable manufacturing.

Evaluation studies have shown that these second paradigm programs are moderately effective in encouraging growth or productivity in the served companies. Regarding the MEP program, Nexus

[9] For more complete information on size standards, see SBA's Small Business Size Regulations (13 CFR §121) or the Table of Small Business Size Standards

[10] D.L. Birch, The Job Generation Process, M.I.T. Program on Neighborhood and Regional Change, Cambridge, MA, 1979.

[11] Bruce, D., et al (2007). "Small Business and State Growth: An Econometric Investigation," U.S. Small Business Administration Office of Advocacy.

Associates (1999) estimated that the impact of services provided by MEP centers in Pennsylvania between 1989 and 1999 increased productivity by between 3.6 and 5.0 percent and increased output by between 1.9 and 4.1 percent.[12] Youtie et al (2008) estimated that Georgia Tech clients (including those of the Georgia MEP) experienced a 12 percent increase in value-added (a measure of productivity) from 2005 to 2007.[13] Jarmin's multi-state analysis of the impact of MEP services concluded that receipt of MEP services between 1987 and 1992 was associated with an increase in productivity of 3%-16%.[14]

Small Business Innovation Research (SBIR) Program

The Small Business Innovation Research (SBIR) program stimulates small business R&D by requiring that large national extramural R&D funding agencies (with R&D budgets over $100 million) to allocate a percentage of this funding (up to 2.5%) to small businesses. The SBIR (and its companion, Small Business Technology Transfer or STTR program, which promotes business-university/federal laboratory cooperation) offer Phase 1 awards for feasibility analysis and Phase 2 awards for further proof of concept work. States often have "Phase 0" programs to provide matching funds for SBIR awards and "Phase 3" programs to fund commercialization, given that the federal government does not provide Phase 3 funds under the program. The Innovation Development Institute reported that from 1983 through to 2006, SBIR had 16,222 participating firms; 57,280 patents granted; 1,496 venture capital investments, leveraging $26.8 billion in venture capital; 597 publicly-traded companies; and 914 mergers and acquisitions.[15] Studies have suggested that there is a relationship between SBIR funding and receipt of private sector venture capital, without a strong "crowding out" effect of public for private investment moneys. Lerner (1999) found that Phase 1 SBIR awardees grew faster and were more likely to attract venture capital than similar non-awardees, although this effect was limited to those regions which already had venture capital and high-technology.[16] A study of the SBIR program of the Department of Defense found that the SBIR encouraged R&D and commercialization that would not have otherwise taken place and that there were substantial societal gains from this commercialization (Audretsch et al, 2002). [17]

An analysis of the SBIR program with respect to energy-related SBIR awards in the Southeast shows that the program has some presence in the region, albeit a weak one (See Table 1.1). The region has 25 percent of the US population but only 15 percent of SBIR awards in the 2000 to 2010 time period, and just over 10 percent of energy-related SBIR awards. This lack of emphasis is reflected in the location quotient in Table 1.1, with the location quotient comparing the share of energy-related SBIR awards to

[12] Nexus Associates (1999) "The Pennsylvania Industrial Resource Centers: Assessing the Record and Charting the Future.
[13] Youtie, J., Shapira, P, Kay, L, Rivera, A., Lynch, G., Cutler, G., Fernandez-Ribas, A. (2008). Innovation in Manufacturing: Needs, Practices, and Performance in Georgia 2008-2010. Atlanta, Georgia, 2008.
[14] Ron S. (1999) "Evaluating the Impact of Manufacturing Extension on Productivity Growth" Journal of Policy Analysis and Management, 18 (1): 99-119.
[15] Shapira P, and Youtie J. (2010). The Innovation System and Innovation Policy in the United States. , in Rainer Frietsch and Margot Schüller (Eds.) Competing for Global Innovation Leadership: Innovation Systems and Policies in the USA, EU and Asia. Stuttgart: Fraunhofer IRB, Chapter 2.
[16] Lerner, J. (1999): The Government as Venture Capitalist: The Long-Run Impact of the SBIR Program, The Journal of Business, 72 (3), 285-318.
[17] Audretsch, D., A. Link, and J. Scott, (2002): Public/private technology partnerships: evaluating SBIR-supported research. Research Policy, 31, 145-158

all SBIR awards by Southeastern state. All Southeastern states in this analysis, except for Tennessee and Arkansas, have location quotients below 1.0, which is indicative of less concentration in energy-related SBIR awards. Tennessee has very strong performance in energy-related SBIR awards because it is the location of the only DOE federal laboratory in the Southeast.

Table 1.1. SBIR Awards in the Southeast: 2000-2010

Southeastern States	2000-2010 All SBIR	2000-2010 Energy SBIR	All SBIR State Rank	Energy SBIR Rank	Energy SBIR Location quotient*
Alabama	$362,211,943	$6,315,235	14	24	0.31
Arkansas	$59,516,168	$3,599,908	36	29	1.07
Florida	$421,719,793	$16,705,928	12	17	0.70
Georgia	$194,260,473	$7,343,000	24	23	0.67
Kentucky	$60,392,966	$941,926	35	44	0.28
Louisiana	$39,306,255	$0	44	50	0.00
Mississippi	$27,737,188	$99,992	48	47	0.06
North Carolina	$327,885,925	$6,200,166	15	25	0.33
South Carolina	$75,204,337	$1,799,712	30	39	0.42
Tennessee	$123,876,746	$20,236,917	27	14	2.89
Virginia	$1,040,571,628	$45,841,981	3	4	0.78
West Virginia	$41,306,099	$1,997,466	43	35	0.85
Southeast	2,773,989,521	111,082,231			0.71
All States	18,130,244,359	1,026,332,004			1.00

*A location quotient is a measure of a region's share of a particular sub-area (in this case energy-SBIR awards) divided by the region's share of the overall area (in this case, all SBIR awards).[18]

Industrial Assessment Centers (IACs)

The Industrial Assessment Centers (IAC) is a network of 26 university-based centers that reviews manufacturers' facilities, operations, and machinery to identify energy efficiency, waste minimization, pollution prevention, and productivity improvements. These assessments are conducted on a no-fee basis, with the manufacturer then being responsible for implementation of recommendations. The IAC is administered by the US Department of Energy's Industrial Technologies Program. Each assessment includes a set of recommendations which includes estimates of costs, benefits, and payback periods.

More than 5,500 assessments were conducted nationwide from 2000 to 2010, over 1,500 of which were conducted in the Southeast. Since the IAC's inception in 1981, these assessments have made nearly 110,000 recommendations, of which fewer than half (47%) were actually implemented as determined

[18] Source: US Small Business Administration, Tech-Net, http://web.sba.gov/tech-net/docrootpages/index.cfm, accessed June 2010.

by a post-assessment survey.[19] Manufacturers in the Southeast have implemented 45% of their recommendations since 1981, closely mirroring the national implementation rate.

Table 1.2 shows the total costs and savings of implemented projects in the Southeast between 2000 and 2010.

Table 1.2 IAC Implemented Recommendations in the Southeast (2000 – 2010)

Southeastern States	Number of Implemented Recommendations	Costs ($)	Savings ($)
Alabama	223	5,393,793	3,642,603
Arkansas	175	2,017560	5,018,663
Florida	1,139	12,698,560	26,351,618
Georgia	496	10,141,207	13,894,005
Kentucky	86	953,866	1,470,016
Louisiana	695	12,760,688	24,406,082
Mississippi	404	3,824,570	6,680,382
North Carolina	573	6,798,550	6,963,138
South Carolina	68	873,825	647,760
Tennessee	196	3,271,178	3,985,377
Virginia	299	2,132,159	5,280,487
West Virginia	362	1,712,473	3,865,847
TOTAL	**4,716**	**62,578,429**	**102,205,978**

Source: US DOE Industrial Technologies Program http://iac.rutgers.edu/database/

Energy-Related Inventions Program (ERIP)

Energy-focused, Paradigm 2 programs include the DOE's successful Energy-Related Inventions Program (ERIP), which fosters energy-related innovations by improving the likelihood that new (non-nuclear) energy technologies will gain a foothold on the market. In partnership with the DOE, the National Institute of Standards and Technology (NIST) evaluates promising inventions in terms of technical feasibility, energy conservation potential, and commercial potential. The inventions that NIST recommends as most promising are eligible for grant support from the DOE (most grants average $70,000 each) and other assistance, such as inventor workshops. The study conducted by Brown and Wilson (1992) indicates that the technologies supported through the ERIP program are at least as effective as their commercially-developed counterparts.[20]

[19] Source: Rutgers, Industrial Assessment Center Database, Accessed July, 2010

[20] Brown, Marilyn and C. Robert Wilson (1992). Promoting the Commercialization of Energy Inventions: An Evaluation of the Energy-Related Inventions Program. Policy Studies Journal, Vol. 20, No. 1 (87 – 101).

R&D tax credits are fiscal tools (outside of grants or loans) for stimulating R&D in existing industries. As such, they span Paradigm 1 and Paradigm 2 strategies, although they tend to be targeted to existing industries to promote R&D rather than as a relocation tool. The federal government and most state governments offer R&D tax credits. Studies of R&D tax credits find that it can be difficult for small high tech startups to use; indeed NSF reported that fewer than four percent of R&D expenditures in the private sector were accounted for in federal Research & Experimentation tax credit claims. In addition, the lack of consistency and permanence, incentive effects, and complicated procedures have also been raised as concerns. Still, the impact of the R&E tax credit has been found to stimulate increased business R&D investment on a dollar-for-dollar basis and reduce the cost of R&D.[21]

Business incubators, which provide low cost space and technical and business assistance, have also been found to be effective. A survey of businesses that used incubator services reports that the incubator was important in the success of two-thirds of the responding businesses. [22]

On the other hand, Paradigm 2 strategies are not without their problems. First, small firms have not always been found to have a strong impact on their local economies. Breznitz and Taylor (2009) report that 40 percent of Atlanta's high-tech start-up companies leave for other states within three years.[23] One reason is elucidated by Powell and colleagues, who report that many small biotechnology businesses are required by their venture capital investors to be located nearby.[24] Second, the number of firms in these programs is small relative to the size of the larger economy. For example, even existing industry programs, such as MEP, do not serve the majority of manufacturing enterprises, with the average number of manufacturers served in a given state at around 10 percent a year.[25] Third, a focus on start-up firms in emerging industries by itself ignores the scale-up phase when the technology transitions to manufacturing. Grove (2010) argues that this critical phase has increasingly been lost to the U.S.[26]

By the early 1990s, leading thinkers in the economic development field suggested that the targeting of either large firms ("first paradigm") or small firms ("second paradigm") had significant limitations. While a few large companies might be attracted to an area or some small businesses started, neither strategy was likely to result in large-scale, high-wage regional employment growth. Moreover, given increased technological and global competition, the existing strategies were inadequate without a more comprehensive focus on improving the competitive capabilities of the localities.

[21] National Science Board, (2006): Science and Engineering Indicators, Arlington, VA: National Science Foundation. http://www.nsf.gov/statistics, accessed July 12, 2007; Guenther, G. (2005): Research and Experimentation Tax Credit: Current Status, Legislative Proposals, and Policy Issues, Washington, DC: Congressional Research Service.

[22] Molnar, L., Grimes, D., Edelstein, J., DePietro, R., Sherman, H., Adkins, D., et al. (1997).Impact of business incubator investments. Athens, OH and Ann Arbor, MI: National Business Incubation Association and University of Michigan.

[23] Breznitz, D., Taylor, M (2009). The Communal Routes of Entrepreneurial-Technological Growth: Social Fragmentation and the Economic Stagnation of Atlanta's IT Cluster. Atlanta, GA: Georgia Institute of Technology.

[24] Powell, W., Koput, K., Bowie, J., Smith-Doerr, L., 2002. The spatial clustering of science and capital: accounting for biotech firm-venture capital relationships. Regional Studies 36 (3), 291–305.

[25] Shapira, P, 1998. Extending Manufacturing Extension, Issues in Science and Technology, Spring, 45-50.

[26] Andy Grove (2010). How America Can Create Jobs, Bloomsberg Businessweek, July 1.

PARADIGM 3: REGIONAL INNOVATION CLUSTER DEVELOPMENT

A third paradigm strategy thus emerged, focusing on "regional cluster policies." These approaches involve assessing and upgrading the indigenous capabilities of regions to strengthen linkages among enterprises (of all sizes) with infrastructural capabilities (such as universities) to foster dynamic regional industry clusters.[27] An industry cluster is defined as "a geographically bounded concentration of interdependent businesses with active channels for business transactions, dialogue, and communications."[28] Under this definition, an industry cluster is comprised of firms in the same or similar/related industries in a geographically contiguous area, and these firms interact with one another (e.g., through exchanging of information, sharing of talent, using of common infrastructure) to compete in the market place. Regional innovation clusters are industry clusters that experience a competitive advantage as a result of their geographic proximity, which includes economies of scale, greater efficiencies, reduced costs, and knowledge sharing due to inter-firm collaboration and networking.

The idea of cluster policies is not new in regional innovation development. However, it was given fresh attention as a result of an effort in the late 1990s led by Professor Michael Porter and the Council on Competitiveness called the "Clusters of Innovation Initiative." Based on qualitative and quantitative data gathered by Professor Porter and his colleagues and the "Diamond of Competitiveness" model, the initiative began by focusing on five metropolitan areas, identifying selected industries in which each region was deemed most competitive, and eventually selecting 590 industries that represent 41 cluster types.[29]

In addition to the national approach, cluster initiatives have been prominent in most sub-state regions or cities. Many cluster approaches have specified particular industries or technology areas, such as biotechnology or software. One example is Research Triangle Park in North Carolina. The only area in the South considered to be a biotechnology center by the Brookings Institution's *Signs of Life,*[30] Research Triangle, has a critical mass of bioscience R&D facilities and start-up firms based in part on their educational and workforce capabilities and research and business infrastructure.

In the renewable energy domain, the rebirth of the city of Toledo and adjacent municipalities in Northwestern Ohio is an example of a regional innovation cluster in photovoltaics. The photovoltaics cluster draws on the region's longstanding strength in glass technologies for automotive and related industries. The cluster is anchored by First Solar, one of the top global photovoltaics manufacturers in the world. There are more than 25 other local companies in the photovoltaics industry, many of which focus on second generation thin-film devices. The cluster also is comprised of suppliers of glass,

[27] Piore, M. and Sabel C. 1984 The Second Industrial Divide: New Possibilities for Prosperity. New York: Basic Books. Indergaard, M. 1996. Making networks, remaking the city, Economic Development Quarterly, 10, 2, pp. 172-187. Saxenian, A. 1994. Regional Advantage: Culture and Competition in Silicon Valley and Route 128. Cambridge, MA: Harvard University Press; Porter, M. 1990. The Competitiveness of Nations. New York: Free Press.

[28] Rosenfeld, S. (1997) Bringing business clusters into the mainstream of economic development. European Planning Studies, 5 (1), pp. 3-22.

[29] Council on Competitiveness, Clusters of Innovation: Regional Foundations of US Competitiveness, Washington DC, 2001.

[30] Cortright, J. and Mayer, (2002), Signs of Life: The Growth of Biotechnology Centers in the US. Washington DC: The Brookings Institution Center on Urban and Metropolitan Policy.

chemicals, silicon, engineered materials, and other upstream materials. In addition, there are downstream roofing materials companies, installers, green construction companies and contractors, and other related industries. The industry is oriented around the University of Toledo, which provides research, workforce, and entrepreneurship services in its incubator. The local community college also offers weeklong photovoltaics training programs. The state of Ohio has fostered connections between the private sector, university, and local economic development organizations through the Ohio Third Frontier program. The Third Frontier program has made key investments such as (1) an $18.6 million center of excellence – The Center for Photovoltaics Innovation and Commercialization, (2) research commercialization grants to photovoltaics companies, and (3) venture investments by Toledo's Regional Growth Partnership and Ohio Third Frontier-funded Entrepreneurial Signature Program – Rocket Ventures. In addition, the state passed legislation for a Renewables Portfolio Standard in 2008, which requires by 2025 that 25 percent of all Ohio's electricity must come from alternative energy sources, at least half of which must be generated in the state. This greatly enhances the local market for photovoltaics in the state. The related Ohio Technology Investment Tax Credit also plays a role in incentivizing tax payers to investment in small Ohio technology companies, including photovoltaics firms and the related Ohio Capital Fund has successfully attracted venture capital to the state. In 2008, the industry employed more than 3,000 workers in the greater Toledo area, representing a 38 percent increase over 2004 levels. This example shows how economic development tools from all three paradigms are used synergistically to support the emergence of a regional innovation cluster in Northwestern Ohio.[31]

One common observation about industry cluster initiatives (both national and regional) is that they tend to target the same or similar sets of broad industries, such as information technology or bioscience, suggesting that it is difficult to identify where the differentiated competitive advantage lies. Moreover, although it is observed that places with industry clusters have a competitive advantage – such as a specialized labor pool across a concentration of similar industries, a concentration of suppliers and specialized service providers to these industries, and technological innovation and knowledge exchange – it is difficult for places that do not have fully-formed clusters to shape them through policy activity alone. Consequently, evidence of returns from these types of third paradigm programs is sparse.[32]

[31] SRI International (2009), Making an Impact: Assessing the Benefits of Ohio's Investment in Technology-based Economic Development Programs, Case Study Appendix.

[32] Spencer, Gregory M. , Vinodrai, Tara , Gertler, Meric S. and Wolfe, David A.(2010) 'Do Clusters Make a Difference? Defining and Assessing their Economic Performance', Regional Studies, 44: 6, 697 — 71

SUMMARY

In summary, the types of returns, benefits, and costs that can be expected from economic development policies and programs in each of the three paradigms are recapped in Table 1.3. This paradigm-based categorization represents an overview of the expansion of economic development practices over time, and is provided to support an understanding of the evolution of economic development, specifically in the context of energy-related policy. Section 2 will present the renewable and energy efficiency correlations for each of these paradigms.

Table 1.3. Economic Development Returns/Benefits and Costs by Economic Development Paradigm

Economic Development Paradigm	Cost/Drawback	Return/Benefit
Paradigm 1. Competition for Business Location (e.g., tax credits, relocation, incentives)	Reduced revenue for government services. Branch facilities are closed before performance targets are met.	10% tax cut results in about a 2% to 3% gain in employment or other similar outcomes
Paradigm 2. Promotion of Entrepreneurship and Existing Industries (e.g., technical assistance, incubators, early-stage capital)	Requires resources to set up small business assistance services. Many small firms leave to be near venture capital or for other factors.	• Receipt of technical assistance (MEP) results in an increase in productivity of 3%-16% • R&D tax credits increase business R&D investment on a dollar-for-dollar basis • SBIR awards lead to faster growth and attraction of private venture capital • Incubators are important in the success of two-thirds of the responding businesses
Paradigm 3. Regional Innovation Cluster Development	Difficult to define what a cluster is or to shape it through policy.	Economies of scale/reduced costs, other enhanced efficiencies, greater competitiveness, and knowledge sharing

SECTION 2. POLICY INVENTORY OF ENERGY INVESTMENT DRIVERS

This section provides an inventory of clean energy policies and analyzes the impact of clean energy[33] – including policies in renewable energy and energy efficiency – in order to provide a context of how states apply these policies from an economic development perspective in the Southeast.[34] The Database of State Incentives for Renewables and Efficiency (DSIRE) was used as the primary source for data collection of the 12 Southeastern states, with the Southern States Energy Board's (SSEB) annual Legislative Digest (2009) used as the supplementary source. The DSIRE database is maintained and continually updated through the North Carolina Solar Center. The policies and programs presented in this section are current from the database as of July 15th, 2010.[35] The SSEB Legislative Digest is updated annually (published in August), and includes environmental and energy legislation enacted by the 18 member states.[36]

The DSIRE website provides comprehensive, updated information about renewable energy and energy efficiency incentives and policies in effect in the United States. For purposes of this project, only the policies and incentives established by state governments were reviewed. Although policies from federal and local governments, utilities, and non-profit organizations are available in DSIRE, they were not reviewed as part of this scope of work. DSIRE organizes incentives and policies into two general categories: 1) Financial Incentives; and 2) Rules, Regulations & Policies.

- **Financial Incentives** include a variety of tax incentives, grants, loans, rebates, industry recruitment/support, bond programs, green building incentives, leasing/lease purchase programs and performance-based incentives.
- **Rules, Regulations & Policies** include public benefits funds, renewable portfolio standards, net metering, interconnection standards, line-extension analysis, contractor licensing, equipment certification, solar/wind access laws, solar/wind permitting standards, construction & design standards (including building energy codes and energy standards for public buildings), mandatory utility green power options, and green power purchasing policies, appliance/equipment efficiency standards, and public benefits funds.

Within those two categories, DSIRE further segments the incentives and policies into 28 specific sub-categories. For purposes of succinct description, many of these categories could be consolidated into broader "buckets." Related sub-categories – building energy codes, contractor licensing, green building incentives, and energy standards for public buildings – could be consolidated into a singular "Building Codes" category that captures all of these policies. These 28 sub-categories were eventually narrowed to six broader categories.

[33] Clean Energy is defined as a renewable (naturally replenished) energy resource, which does not pollute or use the burning of fossil fuels in its production. Nuclear and clean coal technologies were *not* reviewed as part of this project.
[34] As defined for this project, the Southeast comprises 12 states: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.
[35] With the exception of Transportation, which was obtained from the SSEB database.
[36] Since the SSEB digest is an annual publication and not a "live" database (as is DSIRE), it may become outdated relatively quickly – particularly since the North Carolina legislature was still in session at the time of its last publication.

Although DSIRE does not capture policies related to transportation, the category was added to disseminate legislation that would further advance low carbon technology designed to reduce greenhouse gas (GHG) emissions (e.g., biodiesel, E85 and ethanol blends), particularly in the government-procured (e.g., fleet vehicle) arena in the Southeast. The SSEB Legislative Digest captures transportation-related legislation in its "Energy Legislation" category – specifically, within the Alternative Energy Development, Energy Efficiency, Natural Gas and Petroleum, and Utilities sub-categories.

The energy-related profiles from DSIRE and SSEB (445 total) were consolidated into seven broad categories, each of which is described below:

1. **Building Codes –** Establish standards through which states and local governments provide technical assistance to developers, builders, and architects to regulate the design and construction of energy-efficient improvements in new and renovated buildings. Includes building energy codes, contractor licensing, green building incentives, and energy standards for public buildings.
2. **Renewable Energy and Net Metering –** Investment in renewable technologies. Net metering regulations and interconnection standards address billing, credits, insurance, and the technology requirements to connect to a grid, monitor power generation, and address system capacity. Includes corporate exemption, equipment certification, interconnection, net metering, and solar/wind policies.
3. **Tax Credits and Rebates –** Provide financial incentives for investment in energy efficient and renewable energy technologies, including the installation of energy efficient or renewable energy equipment (new installations and retrofits) for energy generation and savings. Some tax credits and rebates promote clean energy industry job creation. Includes corporate tax credits, industry recruitment and support, local rebate programs, personal deductions and tax credits, state rebate programs, utility rate discounts, and utility rebate programs.
4. **Renewable Portfolio Standards and Energy Efficiency Resource Standards –** Require that a utility provide a certain percentage of the energy from renewable sources by a specified future date, in order to accelerate the development of renewable technologies as well as to reduce greenhouse gas emissions. Includes green power purchasing, mandatory utility green power options, and specific renewable portfolio standards.
5. **Loan and Grant Policies –**Provide financial assistance for investment in capital or equipment that enhances energy efficiency or promotes renewable energy. Includes state and local grant and loan programs, utility grant and loan programs, leasing programs, and Property Assessed Clean Energy (PACE) financing.
6. **Capital, Equipment, and Production Incentives –** Promote capital investment of renewable energy equipment and select energy efficient installations. Includes sales tax, property tax, and production incentives.
7. **Transportation –** New standards, enhanced existing standards, or clarified language related to government-procured (e.g., fleet vehicle) low-carbon fuel technology. Low-carbon fuels include

biofuels and alternative fuels (such as electric, compressed natural gas). Obtained from the SSEB database.

PROGRAM HIGHLIGHTS:

12 STATES IN THE SOUTHEAST HAVE BUILDING CODES

MANDATORY USE OF THE STATE CODE:
FLORIDA, GEORGIA, KENTUCKY, AND VIRGINIA

LOCAL ADOPTION TO BE ENFORCED:
ALABAMA, ARKANSAS, LOUISIANA, MISSISSIPPI, NORTH CAROLINA, SOUTH CAROLINA, TENNESSEE, AND WEST VIRGINIA

BUILDING CODES

Building codes can provide enforceable or voluntary standards through which states and local governments provide technical assistance to developers, builders, and architects to regulate the design and construction of energy-efficient improvements in new and renovated buildings. The codes provide a simplified method to determine amounts of insulation to install, types of windows and doors, as well as the minimum energy efficiency rating of heating, cooling, and water heating equipment to install. These improvements can impact energy use for the life of the building. Some states require mandatory use of the state code while others allow for building code adoption and enforcement at the level of the local municipality. Building codes are typically implemented through the state building commission or local code enforcement department, as appropriate. Once development plans are submitted, they are reviewed by building code inspectors, who check the plans for compliance with the specifications of the state or locally-adopted building codes. When plans are approved by the authority, code compliance officers make one or more site visits to ensure compliance with the plans and building code(s).

While all states have building codes, there are particular initiatives that are targeted to the promotion of green building. There are four types of building codes found in state legislation that are significant for green building in the Southeast: (1) state/local **Building Codes, (2) Contractor Licensing** programs, **(3) Energy Standards** for public buildings, and **(4) Green Building Incentives.**

1. **Building Codes** promotion of energy efficiency and use of renewable energy vary from improvement-specific standards such as caulking/weather-stripping, duct/air sealing, building insulation, windows and doors, etc. on residential buildings, to comprehensive measures for the entire building in the commercial and residential sectors. According to the DOE, buildings use 39% of our total energy (compared with 27% of carbon emissions from energy consumption in the Industrial sector and 34% of the emissions in the Transportation sector), two-thirds of our electricity, and one-eighth of our water. In light of these fundamental environmental issues, and the increasing cost of energy and our current economic challenges, building energy efficiency is a key component of sound public policy.

2. **Contractor Licensing** is another type of green building code-related program. In Florida, solar contractors have the authority to install, maintain and repair solar hot water systems, solar pool heating systems and photovoltaic systems in residential, commercial and industrial facilities for compensation. Installers must have four years of experience to qualify for a license, which may include both installation and education and at least one year of experience in a supervisory role. An individual must also pass an examination to become certified as a solar contractor.

3. **Energy Standards** encourage state and local agencies (including education facilities) to use a rating system from a recognized environmental rating agency, such as the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) or Green Globes whenever possible when funding a public building project, in an effort to reduce energy consumption, usually by some state-specified percentage. For example, some states require that all new educational facilities with hot water demands that exceed 1,000 gallons per day must include a solar water heating system that provides at least 65% of hot water needs (whenever economically feasible). Eligible technologies vary by state and may include Energy Star appliances, Passive Solar Space Heat, Solar Water Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics, Landfill Gas, and Daylighting.

4. **Green Building Incentives** provide financial incentives for commercial, industrial, and residential projects when participants either purchase or install energy efficient and renewable energy technologies, or receive a certification by a recognized environmental rating agency, such as the LEED rating system. These incentives apply during the permitting stage of the projects in the form of an expedited permitting process, or reduced/waived building permit fees. Financial assistance varies by state and type of technology. For example, in the City of Asheville, North Carolina, waivers vary from $50 for installation of a geothermal heat pump, solar energy system, wind turbine, or stormwater collection device, to $100 for a "HealthyBuilt Home" certification or Energy Star rating. Mecklenburg County, North Carolina will issue a flat rebate of up to 25% (up to $100,000) for the cost of a permit for new commercial projects which are certified under LEED or Green Globes. Other state programs grant density bonuses and/or height bonuses to building projects which receive LEED certification.

Activities in the Southeast

All 12 states in the Southeast region use building codes in some form to encourage the use of clean energy standards. However, only four states require the use of mandatory state-wide codes. The other eight states require adoption at the local level (city or county) to be enforced. The following table illustrates the types of programs in the Southeast related to green building codes:

State	Program/Policy Type	Name
Alabama	Building Code	Alabama State Energy Code for Buildings (locally-adopted)
	Energy Standard	Energy Standards for State Agencies
Arkansas	Building Code	Arkansas Energy Code (locally-adopted)
	Energy Standard	Green Building Standards for State Facilities
Florida	Building Code	Florida State Building Energy Code (mandatory)
	Energy Standard	Energy Conservation in Public Buildings
	Contractor Licensing	Solar Contractor Licensing

State	Program/Policy Type	Name
	Green Building Incentive	Green Buildings Expedite Process (Miami-Dade County)
Georgia	Building Code	Georgia State Energy Code for Buildings (mandatory)
	Energy Standard	Sustainable Development Design Standards (City of Atlanta)
		LEED Requirement for Public and Commercial Buildings (City of Chamblee)
		Georgia Governor's Energy Challenge 2020
Kentucky	Building Code	Kentucky Building Energy Codes (mandatory)
	Energy Standard	Energy Efficiency Program for State Government Buildings
		Kentucky Energy Efficiency Program for Schools
Louisiana	Building Code	Louisiana State Building Energy Code (locally-adopted)
	Energy Standard	Energy Reduction in Major State Facilities
Mississippi	Building Code	Mississippi Building Energy Codes (locally-adopted)
North Carolina	Building Code	North Carolina State Building Energy Codes (locally-adopted)
	Energy Standard	Conservation of Energy and Water Use in State Buildings
		Efficiency Standards for City Buildings (City of Asheville)
		Energy Conservation Requirements for Town Buildings (City of Chapel Hill)
		High-Performance Building Policy (Durham County)
	Green Building Incentive	Building Permit Fee Waiver (City of Asheville)
		Green Construction Permitting Incentive Program (Catawba County)
		Green Building Incentives (local option)
		Green Permit Rebate Program (Mecklenburg County)
South Carolina	Building Code	South Carolina Building Energy Code (locally-adopted)
	Energy Standard	State Building Energy Standards (for public buildings)
Tennessee	Building Code	Memphis - Energy Efficiency of Rental Properties
		Tennessee State Energy Code for Buildings (locally-adopted)
	Energy Standard	Energy Star Procurement Requirement for Agencies
Virginia	Green Building Incentive	Green Building Incentive Program (Arlington County)
	Building Code	Virginia State Building Energy Code (mandatory)

State	Program/Policy Type	Name
	Energy Standard	State Buildings Energy Reduction Plan
West Virginia	Building Code	West Virginia State Building Energy Code (locally-adopted)

Organization

Most state building codes are a combination of the 2003 Edition of the International Energy Conservation Code (IECC 2003, or most current version), which serves as the foundation for the state code, with supplements and amendments provided by the state. Other codes that serve as a foundation include the U.S. Department of Energy's (DOE) Building Energy Codes Program and the Building Codes Assistance Project (BCAP), the 1977 Model Code for Energy Conservation (MCEC), or the code may be developed by the state's Building Council.[37] Similarly, energy standards are derived through such legislation and are authorized through a type of Sustainable Buildings Program administered by the state Energy Office, or a designated Energy Officer.

The state building commissions have the authority to modify the code to meet its desired energy standards of the state. Building commissions and housing authorities enforce mandatory state-wide codes. If adoption is required at the local level, the local building commissions enforce the code. The DOE offers several products that states can distribute to design professionals, builders, and code officials for code compliance and enforcement of residential and commercial projects, including manuals and software to determine compliance with the ASHRAE standards or the IECC.[38]

Costs and Benefits

The actual costs of implementing building codes are included in coming into compliance with the International Energy Conservation Code, or the relevant energy code(s) on which the state code is based. For jurisdictions that adopt the statewide codes, compliance is determined by plan review and inspection by local building officials. If local jurisdictions do not adopt the statewide codes, contractors, builders, and architects are responsible for complying with the provisions of the codes – which could come at the cost of building materials, but these costs are typically planned for and included in the initial architectural plan preparation process.

While some states require all new public buildings to use energy-efficient technologies in their energy standards, some states like Florida require that existing publicly-owned buildings must also be retrofitted to achieve a recognized energy rating. In addition to public buildings, requirements may also apply to private development that meet some pre-designated square footage - including commercial buildings, offices, industrial buildings, multiple residences and senior citizen multiple residences. If the

[37] Source: DSIRE database. July 15, 2010
[38] Source: U.S, Department of Energy Building Energy Codes Program Technical Assistance to States. Online: http://www.energycodes.gov/implement/pdfs/ta_com.pdf

costs of the materials or rating process are economically prohibitive, developers may steer away from the square footage threshold, which may not meet the highest and best use of the property.

Green building incentives are voluntary, so any costs to the developer would be incurred in the form of energy-efficient materials. Financial benefits include reduced/waived building permit fees. Although the market does not guarantee energy-efficient design and construction, studies on operating costs and resale of commercial spaces built to higher energy efficiencies indicate a direct savings to building owners and occupants, and financial benefits to building owners. For residential construction, homebuyers often are motivated more by up-front costs rather than future operating costs, unaware of the long term savings due to the builder's energy efficient construction.

Studies have shown that green buildings are less costly to operate and that investments in this type of technology have moderate payback periods. The power generation and manufacturing industries only account for less than half of the low-cost potential for reducing emissions, and the cost to reduce these emissions is greater than the relatively low-cost opportunities found in residential and commercial building industry. According to a greenhouse gas reduction report in the McKinsey Quarterly, nearly 25% of the emission reduction potential in the building sector involves measures with minimal or no net cost, while reducing energy demand. These measures include improved building insulation, heating/cooling efficiency, lighting, and appliance efficiency.[39] A recent study found that a large share (more than one-quarter) of Fortune 1000 firms in the Atlanta area were located in green commercial space, even though less than 10% of all commercial space in the Atlanta area is "green." [40]

Conclusion

While they may achieve energy targets for the state, state-wide building codes that are only mandatory if adopted by local municipalities may miss the mark. Local building codes are tailored to the community and can be more readily enforced with trained staff who are knowledgeable about issues in the area. Initial conversations with developers usually occur at this local level first, before detailed decisions about building materials are made. The most effective building codes are likely in those states that utilize both mandatory state codes, in addition to mandatory adoption and enforcement at the local level.

Enhanced building code standards are often at odds with federal government programs that influence mortgage interest tax deductions, which encourage increased home sizes, and highway construction programs that promote sprawl at the expense of mixed-use transit oriented development. [41]

[39] Enkvist, Per-Anders, Tomas Naucler, and Jerker Rosander. "A Cost Curve for Greenhouse Gas Reduction."*The McKinsey Quarterly*" 1 (2007): 35-45. Print.

[40] Rahul Jain. Green Building in Georgia: An analysis of industry trends and the creation of a green building database for Georgia, 2009.

[41] Brown, Marilyn. "Making Homes Part of the Climate Solution." June 2009

PROGRAM HIGHLIGHTS:

10 STATES IN THE SOUTHEAST HAVE POLICIES RELATED TO RENEWABLE ENERGY AND NET METERING

43 TOTAL PROGRAMS

CORPORATE EXEMPTION POLICIES: WEST VIRGINIA

EQUIPMENT CERTIFICATION POLICIES: FLORIDA

INTERCONNECTION STANDARDS: ARKANSAS, FLORIDA, GEORGIA, KENTUCKY, LOUISIANA, NORTH CAROLINA, SOUTH CAROLINA, VIRGINIA

NET METERING: ARKANSAS, FLORIDA, GEORGIA, KENTUCKY, LOUISIANA, NORTH CAROLINA, SOUTH CAROLINA, VIRGINIA, WEST VIRGINIA

SOLAR ACCESS LAW/GUIDELINE: FLORIDA, GEORGIA, KENTUCKY, LOUISIANA, NORTH CAROLINA, TENNESSEE, VIRGINIA

SOLAR AND WIND ACCESS LAW: FLORIDA

WIND PERMITTING STANDARDS: NORTH CAROLINA, VIRGINIA

RENEWABLE ENERGY AND NET METERING

Renewable energy and net metering policies include a wide variety of regulations, rules, zoning easements, and standards to promote investment in renewable technologies. These policies can be broken up into three categories: financial, interconnection and net metering, and land use. Financial policies (i.e., corporate exemption) encourage capital investment in renewable equipment including installation of new renewable systems and retrofitting existing systems. Interconnection standards and net metering regulations address the application process such as billing, credits, and insurance as well as the technology requirements to connect to a grid, monitor power generation, and system capacity classification. Land use regulation includes ordinances and easements that provide rights to renewable energy generators by guaranteeing access to the resource and limiting the restrictions on collection devices. Renewable energy and net metering policies are commonly applied to commercial, residential (single-family, multi-family, neighborhood associations), agricultural, and industrial sectors, but can be applied to other sectors such as local and state government, utility companies, and new construction or renovations. Solar and wind are the two types of renewable energy most widely promoted by these policies. Additional renewable energy sources include biomass, hydroelectric power, and landfill gas.

The seven types of policies included in renewable energy and net metering programs are: **1) Corporate Exemption, 2) Equipment Certification, 3) Interconnection standards, 4) Net Metering, 5) Solar Access law/guideline, 6) Solar and Wind Access law,** and **7) Wind Permitting standards**.

1. The **Corporate Exemption** policy in West Virginia attempts to reduce Business and Occupation (B&O) tax from 40% to 12% of generating capacity. Legislation for this policy was passed in 2001 and applies solely to utility sectors for wind energy generation.

2. **Equipment Certification** policies are used in Florida to maintain quality control of solar water heat and photovoltaic systems. The Solar Equipment Certification was enacted by legislature in 1976 as part of the Solar Energy Standards Act. The Florida Solar Energy Center (FSEC) randomly tests products of certified

manufacturers to maintain quality control of both thermal and photovoltaic systems.

3. **Interconnection standards** establish a uniform process to address the technical requirements and the application process for renewable energy generation. Standards for the technical requirements include system capacity limits (in the southeast standards typically range from 20kW to 30kW for residential systems and from 100kW to 300kW for non-residential). These regulations incorporate the application process by determining the requirements for a standard agreement, insurance, an external disconnection switch, and whether net metering is required. Each interconnection standard has been enacted by state legislature. Representatives for each state that enforce these standards include Public Service Commission, Utilities Commissions, Corporation Commissions, or non-profits (for example, Southern Alliance for Clean Energy).

4. **Net Metering** measures electricity generation of consumers who own renewable energy collection devices or renewable energy facilities. Net metering requirements vary by program, but in general, net metering allows for a type of credit based on the customer's net electricity generation. Net metering rules establish system capacity limits range between 10kW and 500kW, but are typically between 20kW and 30kW for residential systems and 100kW and 300kW for non-residential. Net metering rules also determine excess generation credit, ownership of renewable energy credits (RECs) and the potential for meter aggregation. Most states have legislation that requires utilities to offer net metering to customers. South Carolina was one of the few states without a net metering policy. However, according to the South Carolina Energy Office, the state is considering adopting a policy similar to North Carolina. Net metering regulations determine the applicable utilities and vary by state (such as investor-owned utilities, public, or private corporations). Most programs are administered by Departments of Economic Development, Public Service Commissions, Utilities Regulatory Offices, Utilities Commissions, Departments of Mines, Minerals and Energy. In some cases, private corporations also establish net metering regulations (for example, Duke Energy, Progress Energy, and South Carolina Electric & Gas).

5. **Solar Access Law/guidelines** encourage investment in solar technologies by promoting installation of solar collection devices and prohibiting regulation that restricts solar technologies. Solar access laws and guidelines allow for easements that ensure access to direct sunlight (e.g., tree removal or zoning requirements). Laws and guidelines also prohibit neighborhood associations or homeowners from restricting sales, or prohibiting use, installation, and maintenance of solar collection technologies. Solar access laws and guidelines are established through local and state legislation. Administration and enforcement of these policies ranges from local actors such as town Offices of Sustainability and utility Strategic Planning Departments to state wide agencies including Department of Commerce, Department of Mines, Minerals, and Energy, Economic and Community Development, the Governor's Office, and in the case of Georgia guidelines are administered by Georgia Environmental Facilities Authority (GEFA).

6. The **Solar and Wind Access Law** was established in Florida to protect solar and other renewable energy generating devices. The law prohibits regulation that intends to limit use or installation of

solar devices or other renewable technologies by homeowners or neighborhood associations. Although certain restrictions apply to homeowners (i.e., visibility), this policy was enacted by Florida Legislature and administered by the Florida Solar Energy Research and Education Foundation to promote the installation and use of renewable energy devices

7. **Wind Permitting standards** assist individuals and communities seeking to generate wind energy. Policies in each area describe the conditions required to obtain a permit and the technological requirements. Classification depends on system capacity and varies by state. For example, "small" systems can be less than 20kW or between 20 and 100kW and "large" systems can be over 20kW or over 100kW. In addition to the permitting process and classification, standards also address minimum setbacks, height, noise and shadows, installation and design, and the decommissioning of old systems. Most standards have been enacted through county ordinances. However, the North Carolina Wind Working group also administers one program in North Carolina.

Activities in the Southeast

The following table illustrates the types of programs in the Southeast related to renewable energy and net metering policies:

State	Program/Policy Type	Name
Arkansas	Interconnection	Interconnection Standards
	Net Metering	Arkansas - Net Metering
Florida	Equipment Certification	Solar Equipment Certification
	Interconnection	Interconnection Standards
	Net Metering	Florida - Net Metering
	Solar Access Law/Guideline	Gainesville - Public Facilities
	Solar and Wind Access Law	Renewable Energy Access Laws
Georgia	Interconnection	Interconnection Standards
	Net Metering	Georgia - Net Metering
	Solar Access Law/Guideline	Solar Easements
Kentucky	Interconnection	Interconnection Standards
	Net Metering	Kentucky - Net Metering
	Solar Access Law/Guideline	Solar Easements
Louisiana	Interconnection	Interconnection Standards
	Net Metering	City of New Orleans - Net Metering

		Louisiana - Net Metering
Louisiana	Solar Access Law/Guideline	Solar Rights
North Carolina	Interconnection	Interconnection Standards
	Net Metering	North Carolina - Net Metering
	Solar Access Law/Guideline	Chapel Hill - Land-Use Management Ordinance
		Solar Access Laws
	Solar/Wind Permitting Standards	North Carolina Model Wind Ordinance[42]
South Carolina	Interconnection	Interconnection Standards
	Net Metering	Duke Energy - Net Metering
		Progress Energy - Net Metering
		SCE&G - Net Metering
Tennessee	Solar Access Law/Guideline	Solar Easements
Virginia	Interconnection	Interconnection Standards
	Net Metering	Virginia - Net Metering
	Solar Access Law/Guideline	Solar Access Laws
		Solar Easements
	Solar/Wind Permitting Standards	Rockingham County - Small Wind Ordinance
West Virginia	Corporate Exemption	Tax Exemption for Wind Energy Generation
	Net Metering	West Virginia - Net Metering

Organization

Almost all polices for renewable energy and net metering have been passed through city and county ordinances and legislation or state house or senate legislation. Additional policies or standards have been incorporated by public service commissions or individual utility corporations. These policies are administered and enforced through various agencies, depending on the level of legislation. More detailed description of the type of agencies is described above under each specific policy type. These policies typically include a set of standards, rules, and regulations to promote renewable energy generation. State and local support helps protect consumer's rights, monitor equipment, measure generation, and provide guidelines specific to each area to do so.

[42] Nine counties also have wind permitting standards. See DSIRE Database for detail.

Costs and Benefits

Costs of renewable energy and net metering depend on the type of policy implemented. For example, tax exemptions have an administrative cost in processing applications but also have an opportunity cost in the tax revenue the government would have generated if not for the exemption. Access laws and standards have administrative and enforcement costs to ensure individuals, corporations, and utilities comply with the rules, regulations, and standards. Initial capital investment in renewable technologies can also be high. In general, the cost will vary depending on the type of energy and the specific location of collection devices.

Benefits from renewable energy and net metering policies can be large. The size of benefit depends on the type of renewable energy and system capacity. Renewable energy projects can benefit the individual or community by reducing energy costs and demand on non-renewable energy sources.

Conclusion

The Southeastern states are fairly competitive compared to other regions in rules, regulations, and policies for renewable energy and net metering. Ten states have policies to promote renewable energy generation. These policies are not mutually exclusive. For example, nine states promote renewable energy generation through interconnection standards for a uniform system of application and technology requirements. Eight of the nine states also applied net metering rules to ensure proper measurement and credit for generation. In total, six states passed a type of solar access law/guidelines, solar and wind access law, or a wind permitting standard to ensuring access to the resource through local easements and ordinances. These policies also prohibited a restriction over installation, use, and maintenance of renewable energy collection devices. This is especially important to homeowners associations and condominium associations. North Carolina leads the Southeast in renewable energy and net metering policies as evidenced by the number of policies and other states that use North Carolina as a model.

PROGRAM HIGHLIGHTS:

12 STATES IN THE SOUTHEAST HAVE POLICIES RELATED TO TAX CREDITS AND REBATES

214 TOTAL PROGRAMS

CORPORATE TAX CREDIT: FLORIDA, GEORGIA, KENTUCKY, LOUISIANA, NORTH CAROLINA, SOUTH CAROLINA

INDUSTRY RECRUITMENT AND SUPPORT: ARKANSAS, FLORIDA, MISSISSIPPI, TENNESSEE, VIRGINIA

LOCAL REBATE PROGRAM: FLORIDA

PERSONAL DEDUCTION: ALABAMA

PERSONAL TAX CREDIT: GEORGIA, KENTUCKY, LOUISIANA, NORTH CAROLINA, SOUTH CAROLINA, WEST VIRGINIA

STATE REBATE PROGRAM: ALABAMA, ARKANSAS, FLORIDA, GEORGIA, KENTUCKY, LOUISIANA, MISSISSIPPI, NORTH CAROLINA, TENNESSEE, VIRGINIA

UTILITY RATE DISCOUNT: LOUISIANA, NORTH CAROLINA, SOUTH CAROLINA

UTILITY REBATE PROGRAM: ALABAMA, ARKANSAS, FLORIDA, GEORGIA, KENTUCKY, LOUISIANA, MISSISSIPPI, NORTH CAROLINA, SOUTH CAROLINA, TENNESSEE, VIRGINIA

TAX CREDITS AND REBATES

Tax credit and rebate programs provide a financial incentive for investment in energy efficient and renewable energy technologies. Some tax credits and rebates promote the installation of energy efficient or renewable energy equipment, while others promote clean energy industry job creation. These policies apply to new installations and retrofits. Credits and rebates mainly focus on energy savings but can also be used to encourage energy generation. Common energy efficient equipment includes lighting, central air, doors and windows, clothes washers, dishwashers, refrigerators, water heaters, and comprehensive energy saving measures. Common renewable energy technologies include solar and geothermal, followed by wind and biomass. Credits and rebates are mainly applied to residential (single-family and multi-family) and commercial sectors but can also be applied to the industrial sector, local and state governments, and installers or contractors, agriculture, and construction sectors. Each program has different standards that determine eligible equipment, type of technology, system capacity, and installation requirements.

The eight types of tax credit and rebate programs include: **1) Corporate Tax Credit, 2) Industry recruitment and support, 3) Local Rebate program, 4) Personal deduction, 5) Personal tax credit, 6) State rebate program, 7) Utility rate discount,** and **8) Utility rebate program.**

1. **Corporate Tax Credits** are designed to encourage development and expansion (or retrofit) of renewable energy and energy efficient equipment on residential, commercial, or industrial property. Corporate tax credits vary by state, program, and type of new installation or improvement made. Credits range from 25% to75% of capital, operation, maintenance, and installation costs. Total credit amount can reach between $3,500 and $650,000 in a given year, while some programs will provide up to $12,500 per project. Comprehensive measures range from $0.06 to $1.80 per square foot, depending on type of energy savings and whether it is a new installation or retrofit. Tax credits are also applicable for renewable energy generation. For example, Florida provides $0.01/kWh of renewable energy produced. Terms and conditions including equipment requirements, system capacity, and installation standards also vary by

program. Each corporate tax program has been enacted by state legislature. Program requirements are commonly administered by Departments of Revenue, Offices of the Governor, and Cabinets for Economic Development.

2. **Industry recruitment and support** promotes job creation in the clean energy sector. Program details vary significantly by state. For example, the Miami-Dade County-Targeted Jobs Incentive fund provides $9,000 for every new job created. Tennessee Clean Energy Future requires a $100 million investment that creates 50 full-time jobs at 150% higher salary than the state average occupational wage for at least 10 years. In Virginia's Green Jobs tax credit, a company can earn a $500 for every green job created with a yearly salary above $50,000. In addition, Virginia's Department of Mines, Minerals, and Energy provide $0.75 per watt for solar panels sold in a calendar year (max 6MW). Each of these programs has been enacted by state legislature and administered at both the state and county level.

3. The **local rebate program** in Florida offers a $200 rebate for newly installed solar hot water systems. The Orange County Solar Hot Water Rebate Program provides this rebate to residential and commercial owners. Participants must provide proof of purchase of new system including installation date. Owners must also provide a receipt of a home or building energy audit. New systems installed after April 22, 2008 are eligible for this rebate.

4. **Personal deduction** tax credit in Alabama promotes retrofitting heating systems to use biomass energy in residential heating. The Wood Burning Heating System Deduction statute allows a taxpayer to deduct the purchase and installation of a wood-burning heating system.

5. **Personal tax credits** promote the installation of clean energy equipment, including energy efficient or renewable energy equipment. The credit amount varies by program, state, and type of installation. Amounts for small energy efficient projects (such as windows, doors, water heater, air conditioner, circulating fan, solar and wind installations) range from $100 to $500 per item. Participants can earn $750 towards purchase of energy efficient manufactured homes. Larger amounts vary from $1,400 to $12,500 for renewable energy installations and up to $2.5 million for commercial installations. Terms and conditions such as carryover provisions, equipment requirements, installation requirements, and system size vary by state and program. Each tax credit program is enacted by state legislature and administered by Departments of Revenue, Energy Offices, or State Tax Departments.

6. **State rebate programs** promote investment in energy efficient and renewable energy equipment. Rebates provide reimbursement for equipment installation, new appliances, or comprehensive energy saving measures. State rebates apply primarily to residential, commercial, and government sectors. Rebates for installing energy efficient equipment range from $25 to $400 for small energy efficient equipment (such as clothes washers, dishwashers, freezers, and refrigerators), and $4,000 for more comprehensive building measures like homes built to effectively manage household or building temperature and humidity. Rebates are also

provided for electricity generation. For example, rebates range from $2.00 for a system between 1kW and 30kW; $1.50/W for a system between 30kW and 60kW; and $1.00/W for a system between 60kW and 200kW. Rebates can also range by building size, from $15 to $30 per square foot, depending on type of energy and system capacity size. Rebate terms and conditions vary based on equipment and installation requirements, system size, and funding availability. For example, programs may require equipment that meets Energy Star standards, holds a certain system capacity or certification, and purchased or installed by a specified date. Most systems are funded by the American Recovery and Reinvestment Act (ARRA) of 2009 or the State Energy Efficient Appliance Rebate Program. Rebate programs are administered by Departments of Economic and Community Affairs, Economic Development Commissions, Executive Offices of the Governor, Georgia Environmental Facilities Authority (GEFA), Departments for Energy Development and Independence, Departments of Natural Resources, Development Authorities, Housing Finance Agencies, Departments of Commerce, Departments of Mines, Minerals, and Energy. In certain states such as Tennessee, the Tennessee Solar Institute administers its own program, in collaboration with the University of Tennessee and Oak Ridge National Laboratories.

7. **Utility rate discounts** are provided by utility companies and primarily apply to residential and commercial owners. Discounts encourage investment in energy efficient and renewable energy equipment towards the construction of energy efficient homes. Utility rate discounts vary by program, state, and type of installation. For example, comprehensive building measures can award homeowners a 2% - 10% discount on energy. Programs can offer a lifetime discount, a specific time period in years or seasons, or a specified discount amount in cents per therm). Terms and conditions also vary by program or equipment. For example, most programs require equipment to hold the Energy Star label or meet other verification and standards as determined by the utility companies and program administrators.

8. **Utility rebates** are the most extensive type of policy used to promote energy efficient and renewable energy investments. Multiple types of utility rebate programs are operational in all Southeast states with the exception of West Virginia. These policies cover all possible sectors, but primarily address residential and commercial investments. Utility rebate amounts vary between states, type of project, or whether it is a new installation or retrofit. For example, individual equipment technologies such as lighting, water heat pumps, central air conditioning, attic insulation, doors, and windows are eligible for a rebate from $50 to $2,205, depending on the type of equipment installed. Rebates for comprehensive energy measures for a home or building range from $200 to $32,500, depending on type of investment in energy efficient or renewable equipment. Rebate amounts can also vary by type of generating activity, such as a residential or commercial generator. Terms and conditions for utility rebates vary significantly based on equipment requirement, installation standards, and system size and weight. For example, program terms and conditions may require ENERGY STAR or Touchstone Homes, ARI or ISO certified equipment. Rebate terms also can mandate the use of a certified installer, or a

system that comes with a warranty. Utility rebate programs are administered by state and local government offices, public, private and cooperative utility agencies.

Activities in the Southeast[43]

The following table illustrates the types of programs in the Southeast related to tax credit and rebate policies:

State	Program/Policy Type	Name
Alabama	Personal Deduction	Wood-Burning Heating System Deduction
	State Rebate Program	Alabama - Residential Energy-Efficient Appliance Rebate Program
	Utility Rebate Program	Alabama Gas Corporation - Residential Natural Gas Rebate Program
		TVA Partner Utilities - Energy Right New Homes Program
		TVA Partner Utilities - Energy Right Water Heater Rebate Program
		TVA Partner Utilities - In-Home Energy Evaluation Program
Arkansas	Industry Recruitment and Support	Wind Energy Manufacturing Tax Incentive
	State Rebate Program	Arkansas - Residential Energy-Efficient Appliance Rebate Program
		Renewable Technology Rebate Fund
	Utility Rebate Program	Entergy Arkansas - CityStart Quick Start Energy Efficiency Program for Cities, Counties, and Schools
		Entergy Arkansas - Commercial and Industrial Energy Efficiency Programs
		Entergy Arkansas - Residential and Small Commercial AC Tune-Up
		Entergy Arkansas - Residential Compact Fluorescent Quick Start Program
		Entergy Arkansas - Residential Energy Efficiency Programs
Florida	Corporate Tax Credit	Renewable Energy Production Tax Credit
		Renewable Energy Technologies Investment Tax Credit
	Industry Recruitment/Support	Miami-Dade County - Targeted Jobs Incentive Fund
	Local Rebate Program	Orange County - Solar Hot Water Rebate Program
	State Rebate Program	Solar Energy System Incentives Program
	Utility Rebate Program	Florida City Gas - Residential Energy Smart Rebate Program

[43] Due to the total number of Utility rebate programs, this table contains programs that are regional or statewide. For information on local programs see DSIRE database.

State	Program/Policy Type	Name
Florida	Utility Rebate Program	Florida Power and Light - Business Energy Efficiency Rebates
		Florida Power and Light - Residential Energy Efficiency Program
		Florida Public Utilities (Electric) - Commercial Energy Efficiency Rebate Programs
		Florida Public Utilities (Electric) - Residential Energy Efficiency Rebate Programs
		Florida Public Utilities (Gas) - Residential Energy Efficiency Rebate Programs
Georgia	Corporate Tax Credit	Clean Energy Tax Credit (Corporate)
	Personal Tax Credit	Clean Energy Tax Credit (Personal)
	State Rebate Program	Georgia - Residential Energy-Efficient Appliance Rebate Program
	Utility Rebate Program	Georgia Power - Energy Efficiency Home Improvement Rebates
		Georgia Power - Energy Star New Home Builder Rebate Program
		TVA Partner Utilities - Energy Right New Homes Program
		TVA Partner Utilities - Energy Right Water Heater Rebate Program
Kentucky	Corporate Tax Credit	Energy Efficiency Tax Credits (Corporate)
		Renewable Energy Tax Credit (Corporate)
		Tax Credit for Renewable Energy Facilities
	Personal Tax Credit	Energy Efficiency Tax Credits (Personal)
		Renewable Energy Tax Credit (Personal)
	State Rebate Program	Kentucky - Residential Energy-Efficient Appliance Rebates
	Utility Rebate Program	Kentucky Power - Residential Heat Pump Rebate Program
		Kentucky Utilities Company - Commercial Energy Efficiency Rebate Program
		TVA Partner Utilities - Energy Right New Homes Program
		TVA Partner Utilities - Energy Right Water Heater Rebate Program
		TVA Partner Utilities - In-Home Energy Evaluation Program
Louisiana	Corporate Tax Credit	Tax Credit for Solar and Wind Energy Systems on Residential Property (Corporate)
Louisiana	Personal Tax Credit	Tax Credit for Solar and Wind Energy Systems on Residential Property (Personal)
	State Rebate Program	Home Energy Rebate Option (HERO)
	Utility Rate Discount	Cleco Power - Power Miser New Home Program

State	Program/Policy Type	Name
		DEMCO - Touchstone Energy Home Program
		Entergy New Orleans - Residential Energy Efficiency Program
		Entergy New Orleans - Small Commercial and Industrial Solutions Program
Mississippi	Industry Recruitment/Support	Mississippi Clean Energy Initiative
	State Rebate Program	Mississippi - Residential Energy-Efficient Appliance Rebate Program
	Utility Rebate Program	Coast Electric Power Association - Comfort Advantage Home Program
		Coast Electric Power Association - Commercial Energy Efficiency Rebate Program
		Pearl River Valley Electric Power Association - Residential Energy Efficiency Rebate Program
		Singing River Electric Power Association - Comfort Advantage Home Program
		Southern Pine Electric Power Association - Residential Energy Efficiency Rebate Program
		TVA Partner Utilities - Energy Right New Homes Program
		TVA Partner Utilities - Energy Right Water Heater Rebate Program
		TVA Partner Utilities – In Home Energy Evaluation Pilot Program
North Carolina	Corporate Tax Credit	Renewable Energy Tax Credit (Corporate)
	Personal Tax Credit	Renewable Energy Tax Credit (Personal)
	State Rebate Program	Housing Finance Agency - SystemVision Energy Guarantee Program
		Steam Trap Rebate Program
	Utility Rate Discount	Duke Energy - Energy Star Homes Rate Discount Program
		Duke Energy - Non-Residential Energy Efficiency Rebate Program
		Duke Energy - Residential Energy Efficiency Rebate Program
		Piedmont EMC - Residential Energy Efficient Heat Pump Rebate Program
		Piedmont EMC - Solar Water Heating Rebate Program
	Utility Rate Discount	Piedmont Natural Gas - Commercial Equipment Efficiency Program
North Carolina		Piedmont Natural Gas - Non-Profit Energy Efficiency Program
		Piedmont Natural Gas - Residential Equipment

State	Program/Policy Type	Name
		Efficiency Program
		Progress Energy Carolinas - Commercial Energy-Efficiency Program
		Progress Energy Carolinas - Home Advantage Builder Rebate Program
		Progress Energy Carolinas - Pilot Solar Water Heating Rebate Program
		Progress Energy Carolinas - Residential Energy-Efficiency Rebate Program
		TVA Partner Utilities - Energy Right New Homes Program
		TVA Partner Utilities - Energy Right Water Heater Rebate Program
South Carolina	Corporate Tax Credit	Biomass Energy Tax Credit
		Solar Energy and Small Hydropower Tax Credit (Corporate)
	Personal Tax Credit	Energy Efficient Manufactured Homes Incentive Tax Credit
		Solar Energy and Small Hydropower Tax Credit (Personal)
	Utility Rate Discount	Progress Energy Carolinas - Rate Discount for Energy Star Homes
	Utility Rebate Program	Duke Energy - Non-Residential Energy Efficiency Rebate Program
		Duke Energy - Residential Energy Efficiency Rebate Program
		Piedmont Natural Gas – Commercial Equipment Efficiency Program
		Piedmont Natural Gas – Residential Equipment Efficiency Program
		Progress Energy Carolinas - Commercial Energy Efficiency Program
		Progress Energy Carolinas - Home Advantage Builder Rebate Program
		Progress Energy Carolinas - Pilot Solar Water Heating Rebate Program
		Progress Energy Carolinas - Residential Energy-Efficiency Rebate Program
Tennessee	Industry Recruitment/Support	Sales and Use Tax Credit for Qualified Facility Manufacturing Clean Energy Technology
	State Rebate Program	Tennessee Solar Institute Solar Installation Grant Program*
	Utility Rebate Program	TVA Partner Utilities - Energy Right New Homes Program
		TVA Partner Utilities - Energy Right Water Heater Rebate Program

State	Program/Policy Type	Name
		TVA Partner Utilities – Home Energy Evaluation Pilot Program
Virginia	Industry Recruitment/Support	Green Jobs Tax Credit
		Solar Manufacturing Incentive Grant (SMIG) Program
	State Rebate Program	Virginia - Residential Energy-Efficient Appliance Rebates
	Utility Rebate Program	TVA Partner Utilities - Energy Right New Homes Program
		TVA Partner Utilities - Energy Right Water Heater Rebate Program
		Virginia Natural Gas - Residential Energy Efficiency Rebate Program
West Virginia	Personal Tax Credit	Residential Solar Energy Tax Credit

**This program functions like a rebate rather than a grant as participants do not compete for funding.*

The Southeast ranks within the middle range for all tax credits and rebate programs. Utility rebate programs are significantly more popular than any other tax credit or rebate program available.[44]

Organization

There are two types of tax credits and rebates available. Most types of tax credits and rebates have been enacted through state legislature. These policies are administered at both state and local level offices. The utility rate discounts and utility rebate programs are not a product of enacted state legislation. These policies are typically created and administered by the utility company at the local level. These two types of policies hold the vast majority of all tax credit and rebate policy programs.

Costs and Benefits

The cost of the tax credits and rebates vary. Key factors include the type of energy efficient technology, size of equipment, or type of renewable energy capture device and system capacity. Tax credit ad rebate programs address a wide range of small equipment investments as well as various comprehensive building measures. Individual equipment investments are smaller and will typically cost less. Costs for these individual projects can range from $25 to $400 depending on the equipment installed. Comprehensive measures involving heat pumps, photovoltaic systems, and housing construction are more expansive and will require higher investment costs. Tax credits and rebates can range from $4,000 to $12,500 to address the higher capital investment. In addition, there will be administrative costs associated with the tax credit and rebate. These costs will come at the expense of local or state governments and utility companies that administer tax credits, discounts or rebate programs.

Benefits of tax credit and rebate programs vary depending on the type of energy efficient equipment installed or renewable energy capturing device used. In general, these programs can help promote the

[44] Source: www.dsireusa.org

capital investment of energy saving technologies. These programs reduce demand for non-renewable energy and can provide financial savings, primarily to commercial and residential owners.

Conclusion

Tax credits and rebates are the most popular policy used in the Southeast to promote energy efficient equipment and renewable energy technology. Each of the twelve states in the Southeast employs at least one type of tax credit or rebate policy. Many states promote multiple policies or multiple programs within one policy type. Many Southeastern states employ four different policy types (i.e., corporate tax credit, personal tax credit, state rebate, and utility rebate).

PROGRAM HIGHLIGHTS:

4 STATES IN THE SOUTHEAST HAVE RENEWABLE PORTFOLIO STANDARD POLICIES:

FLORIDA, NORTH CAROLINA, VIRGINIA, WEST VIRGINIA

3 STATES IN THE SOUTHEAST HAVE ENERGY EFFICIENCY RESOURCE STANDARD POLICIES:

FLORIDA, NORTH CAROLINA, VIRGINIA

RENEWABLE PORTFOLIO STANDARDS AND ENERGY EFFICIENCY RESOURCE STANDARDS

Description

A Renewable Portfolio Standard (RPS) requires that a utility provide a certain percentage of the energy from renewable sources by a specified future date. Renewable sources typically include wind, solar, biomass, or landfill gas. They may also include new technologies not yet available such as hydrogen-based technologies. Some standards allow for the requirement to be addressed through energy efficiency, with the definition and implementation of energy efficiency involving utility submission of lists of efficiency investment measures and capital projects. Rate increases, usually capped in legislation, may accompany RPS to recover costs for investments in renewable and efficiency projects and reduced demand from efficiency measures. Many of the details of implementation of these standards are finalized in subsequent rulemaking. The objective of these policies is to accelerate the development of renewable technologies as well as to reduce greenhouse gas emissions.

Energy Efficiency Resource Standards (EERS) are an analogous omnibus policy to RPS designed to encourage adoption of energy efficiency practices in a utility. EERS are typically applied as part of the regulatory process. EERS typically involve target setting and implementation through end-use efficiency and sometimes combined heat and power (CHP) and codes/standards.

Activities in the Southeast

Policies and programs related to RPS include:

- Florida's JEA Clean Power Program, in which the Jacksonville municipal utility company JEA signed a memorandum of agreement in 1999 in which it would provide 7.5% of its energy from renewable energy sources.
- North Carolina's Renewable Energy and Energy Efficiency Portfolio Standard (REPS), enacted through Gen. Stat. § 62-133.8 passed in 2007, requires all investor-owned utilities in the state to provide 12.5% of 2020 electricity sales from renewable energy resources or energy efficiency practices by 2021. Up to one quarter of this requirement can be fulfilled through energy efficiency technologies through 2021; this share rises to 40% after 2021. Municipal utilities and electric cooperatives are subject to different requirements.
- Virginia's Voluntary RPS (Va. Code § 56-585.2) was enacted in 2007 to encourage utilities to provide energy from renewable sources. In 2009, this legislation was expanded. Utilities would be allowed an increased rate of return for participation in the standard.

- West Virginia's Alternative and Renewable Energy Portfolio Standard (enacted through West Virginia Code §24-2F-1, subsequently amended in June 2009). This standard requires large investor-owned utilities (IOUs) provide 25% of retail electric sales from alternative and renewable energy resources by 2025.

Besides these states and localities, the Southeast is more sparsely represented in this policy area than any other region of the country.

EERS are also relatively sparse in the Southeast compared with other parts of the country. Florida is the only state with mandatory EERS legislative performance standards; the Florida legislation was recently passed in 2010 so the details of implementation have yet to be specified. North Carolina and Virginia both have voluntary targets but mandatory EERS performance standards have not been enacted. EERS typically begin with reduction targets in the 10% range and ramp up to 20% or more over time. EERS elements may include building standards, appliance codes, and CHP programs.

Organization

RPS and EERS are typically instituted through legislative statute. They are often governed by the state public utility or service commission. As the legislation understandably does not explicate all of the details required for implementation, hearings and public input, including from the utilities, contributes to final rulemaking by the public utility or service commission, as was true in the case of North Carolina's RPS.[45] Utility compliance plans submitted to the public utility or service commission are also a major part of implementation.

Costs and Benefits

The costs of this policy vary. Key cost factors include the extent of investment in alternative energy sources or efficiency infrastructure, the extent of performance incentives that the legislation awards the utility for meeting the target, increases in customer rates to compensate providers for reduced revenue streams, and administrative costs in monitoring compliance.

In addition to the lowering of greenhouse gas emissions, one of the primary benefits of the policy is the stimulation of innovation in the local market for renewables and CHP technologies. Many observers have pointed out the effect of this policy in Texas, an early implementer of RPS, in stimulating the market for wind farms and wind turbine technologies. The American Wind Energy Association reports that Texas has created more than 9500 MW of wind-based energy, more than 2.5 times the next largest state.[46]

A study of macroeconomic impacts of EERS in Ohio found was conducted. These impacts included nearly 8,000 new jobs by 2015, rising to more than 32,000 by 2025 and an increase in the gross state product of $444 million in 2015 and nearly $.6 billion in 2025. This study was based on an idealized economic model, rather than a controlled and evidenced based evaluation, however. Because EERS emphasizes

[45] Source: http://www.ncuc.commerce.state.nc.us/reps/reps.htm
[46] .Source: http://awea.org

savings, rather than spending on new technologies (with the exception of CHP and other efficiency technologies), there are limitations to the types of near-term economic development impacts that can be exoected.[47]

Conclusion

Although RPS offers the possibility of encouraging greater economic growth around renewables and efficiency technologies along with a potential for emissions reduction, and EERS offers energy efficiency gains as well as new energy markets for CHP technologies, these policies are not widely implemented in the Southeast. One reason for this lack of implementation is that these policies' regulatory approach has the potential to be less acceptable in this region, where incentives-based methods tend to be more preferable than regulatory ones. The passage of federal legislation to reduce greenhouse gas emissions will likely include some renewable and efficiency standards – for example, the American Clean Energy and Security Act (Waxman-Markey bill) – so specific state standards may not be as important. On the other hand, states without such standards may find themselves in a "catch up" position, both in terms of implementation of emissions reduction measures and setting the climate for renewable and efficiency technologies development and growth.

[47] Meredith Wingate, compilation of slides on EERS for Southern Growth Policy Board Research Team, Energy Foundation.

PROGRAM HIGHLIGHTS:

11 STATES IN THE SOUTHEAST HAVE POLICIES RELATED TO RENEWABLE ENERGY AND NET METERING

78 TOTAL PROGRAMS

LEASING PROGRAM:
MISSISSIPPI

LOCAL LOAN PROGRAM:
KENTUCKY, NORTH CAROLINA

PACE FINANCING:
FLORIDA, GEORGIA, LOUISIANA, NORTH CAROLINA, VIRGINIA

STATE GRANT PROGRAM:
ALABAMA, KENTUCKY, NORTH CAROLINA, TENNESSEE

STATE LOAN PROGRAM:
ALABAMA, ARKANSAS, KENTUCKY, LOUISIANA, MISSISSIPPI, NORTH CAROLINA, SOUTH CAROLINA, TENNESSEE, VIRGINIA

UTILITY GRANT PROGRAM:
FLORIDA, NORTH CAROLINA

UTILITY LOAN PROGRAM:
ALABAMA, ARKANSAS, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, SOUTH CAROLINA, TENNESSEE, VIRGINIA

LOAN AND GRANT POLICIES

Loan and grant policies provide financial assistance for investment in capital or equipment that enhances energy efficiency or promotes renewable energy. Assistance can be applied to new installation or improving existing equipment (retrofitting). Common energy efficient equipment includes water heaters, heat pumps, building insulation, windows, doors, roofs, lighting, central air, and HVAC repair. Common eligible renewable energy equipment includes solar, biomass, geothermal, and wind energy. Loans and grants mainly apply to residential homes (primarily single-family but can also include multi-family and low–income) and commercial buildings. Additional sectors can include agricultural, industrial, non-governmental organizations, schools, utilities, installers and contractors, local government, state government, and institutions.

The seven types of loan and grant programs are **1) The Energy Efficiency Leasing program, 2) Local loan programs, 3) PACE Financing, 4) State grant programs, 5) State loan programs, 6) Utility grant program,** and **7) Utility loan program**.

1. **The Energy Efficiency Leasing Program**, in Mississippi allows the lease-purchase of energy efficient equipment and services (i.e., lighting, boilers, cooling, energy management systems, and windows) for up to 10 years. The program also provides participants access to technical, legal, and financial assistance. The Energy-Efficiency Lease Program is administered by the Energy Division of the Mississippi Development Authority that seeks a third-party financier for the energy efficient equipment and services. This program is applicable to schools, local government, state government, and public or private institutions. The program was enacted through state legislation.

2. **Local loan programs** promote investment in energy efficient and renewable energy equipment through monetary advancement with specified terms. Loan size varies with the type of investment. For example, there are micro loans up to $10,000, small loans up to $35,000, and large loans up to $300,000. In some cases, programs offset 100% of the total cost for eligible participants. Repayment terms such as interest rate (i.e., 8%) and term limits (i.e., between 48 months and 15 years) vary by program specifications. Only one program is enabled by state legislation. Other programs are

administered by the Mountain Association for Community Economic Development and the Kentucky Solar Partnership.

3. **Property Assessed Clean Energy (PACE) financing** requires enactment from legislature that allows homeowners and businesses to borrow money from the city to install energy efficient or alternative energy equipment. Revenue sources are primarily in the form of bonds, third-party financing, or federal contracts. The loan is attached to the property which the owner pays back through an increase in property tax bills.[48] PACE financing has been enacted through legislation in five states (Florida, Georgia, Louisiana, North Carolina, and Virginia) but no program is operational. In all cases, recipients must meet locally specified guidelines that may address size, capacity, or type of eligible energy efficient or renewable energy equipment.

4. **State grant programs** promote investment through energy efficient or renewable energy installations. State grant awards vary by type of project. Maximum awards can range from 25% of the project (up to$10,000) to 40% of the project (up to $75,000) and even up to $100,000 in some cases. In the institutional sector, awards granted can be $22/per student to promote energy efficient schools. Equipment and installation requirements also vary by state. These standards must be met by participants and can include EPA approval, date of installation, or equipment certifications. Some programs are enacted through state legislation while others are part of state-wide grant initiative. Program funding comes from the American Recovery and Reinvestment Act (ARRA), general appropriations, and excess state lottery funds. State grants are administered by Departments of Economic and Community Affairs, Governor's Offices of Agricultural Policy, Energy Efficient School Initiatives, and Departments of Economic and Community Development.

5. **State loan programs** provide financial assistance in the form of low-cost loans to promote investment in energy efficient or renewable energy equipment. Loan amounts vary by state. Small installation incentives range from $50 to $500 for energy efficient or renewable equipment like dishwashers, clothes washers, heaters, or gas furnaces. Financial incentives for business comprehensive building measures (such as lighting, chillers, furnaces, solar space heat, and solar water heat) range from $45,000 to $500,000. Local governments and a single school campus can receive $300,000 and a school system is eligible for a $500,000 loan. Terms and conditions vary among state loan programs. For example, interest rates range from zero to low-interest and repayment terms range from 3 to 10 years depending on energy type, time allotted, and size of business. All programs are administered through a state agency including Economic and Community Affairs, Environmental Quality, Finance and Administration Cabinet, Department of Natural Resources, Development Authority, Department of Commerce, Energy Office, Energy Efficient Schools Initiative, Economic and Community Development, and Mines, Minerals and Energy. Some states have legislative authority for grant programs, but it is not required.

[48] Source: www.pacefinancing.org

6. **Utility grant programs** promote installation of energy efficient equipment in low-income residential, commercial, industrial, and institutional sectors. Utility grant amounts for projects (such as HVAC repair or retrofit, building insulation, windows, and doors) range from $500 to 85% (up to $2000) of total project costs. Terms and conditions also vary among grant programs. For example, low income grants require that participants meet income and housing requirements, such as making less than $35,000 annually and living in a single family home. Commercial, industrial, and institutional participants must meet annual billing demands (i.e., at least 250kW). Utility grants are administered by the city utilities or utility company and details of the grants are determined at the local level.

7. **Utility loan programs** provide financial incentives for participants to purchase and install energy efficient equipment. However, some loans allow for renewable technologies such as geothermal heat pumps, solar water heat, photovoltaic, and wind equipment. Financial assistance for utility loan programs varies by state and type of technology. Loan amounts range from $350 to $15,000 for individual projects (for example, windows, water heaters, heat pumps, programmable thermostats). Comprehensive measures like geothermal heat pumps for single units can range from $3,000 to $10,000 and from $4,000 to 12,000 for multiple units. Terms and conditions also differ between utility programs. For example, interest rates range from 0% to 9.9% and terms also vary from three to 10 years. Utility loan programs are administered by public, private, and cooperative utilities.

Activities in the Southeast

The following table illustrates the types of programs in the Southeast related to loan and grant policies:

State	Program Type	Program Name
Alabama	State Grant Program	Biomass Energy Program
	State Loan Program	Local Government Energy Loan Program
	Utility Loan Program	Alabama Power - Residential Heat Pump and Weatherization Loan Programs
		Cherokee Electric Cooperative - Residential Energy Efficiency Loan Programs
		Cullman Electric Cooperative - Energy Conservation Program
		Dixie Electric Cooperative - Residential Heat Pump Loan Program
		South Alabama Electric Cooperative - Residential Energy Efficiency Loan Program
		TVA Partner Utilities - Energy Right Heat Pump Loan Program
Arkansas	State Loan Program	Small Business Revolving Loan Fund
	Utility Loan Program	First Electric Cooperative - Home Improvement Loans
		North Arkansas Electric Cooperative, Inc - Residential Energy

State	Program Type	Program Name
		Efficiency Loan Program
		OG&E - Energy-Efficient Heating and Cooling Loan Program
		Ozarks Electric Cooperative - Residential Energy Efficiency Loan Program
		Petit Jean Electric Cooperative - Energy Efficiency Loan Program
Florida	PACE Financing	Local Option - Special Districts
	Utility Grant Program	City of Tallahassee Utilities - Low-Income Energy Efficiency Grant Programs
		Orlando Utilities Commission - Home Energy Efficiency Fix-Up Program
	Utility Loan Program	City of Tallahassee Utilities - Solar and Efficiency Loans
		Clay Electric Cooperative, Inc - Energy Conservation Loans
		Clay Electric Cooperative, Inc - Solar Thermal Loans
		Gainesville Regional Utilities- Low-Interest Energy Efficiency Loan Program
		Orlando Utilities Commission - Residential Solar Loan Program
Georgia	PACE Financing	Local Option - Special Districts
	Utility Loan Program	Amicalola EMC - Energy Resource Conservation (ERC) Loan
		Carroll EMC - Residential Energy Efficiency Loans
		Coweta-Fayette EMC - Energy Advantage Loan Program
		Habersham EMC - Energy Efficient Loan Program
		North Georgia EMC - Residential Heat Pump Loan Program
		TVA Partner Utilities - Energy Right Heat Pump Loan Program
		Walton EMC - Prime PowerLoan Program
Kentucky	Local Loan Program	Mountain Association for Community Economic Development - Energy Efficient Enterprise Loan Program
		Solar Water Heater Loan Program
	State Grant Program	Office of Agricultural Policy - On-farm Energy Efficiency & Production Incentives
	State Loan Program	Green Bank of Kentucky - Energy Efficiency Loans for State Government Agencies
	Utility Loan Program:	Pennyrile RECC - Commercial Energy Efficiency Loan Program
		South Kentucky RECC - Energy Efficiency Loan Program
		TVA Partner Utilities - Energy Right Heat Pump Loan Program
Louisiana	PACE Financing	Local Option - Sustainable Energy Financing Districts
	State Loan Program	Home Energy Loan Program
Mississippi	Leasing Program	Energy-Efficiency Lease Program
	State Loan Program	Energy Investment Loan Program
	Utility Loan Program	Coast Electric Power Association - Heat Pump and Weatherization Loan Program

State	Program Type	Program Name
		Mississippi Power - EarthCents Financing Program
		TVA Partner Utilities - Energy Right Heat Pump Loan Program
North Carolina	Local Loan Program	Local Option - Revolving Loan Program for Renewable Energy and Energy Efficiency
	PACE Financing	Local Option - Clean Energy Financing
	State Grant Program	North Carolina Green Business Fund
	State Loan Program	Energy Improvement Loan Program (EILP)
	Utility Grant Program	City of High Point Electric - Commercial Energy Efficiency Grant Program
	Utility Loan Program	Brunswick EMC - Residential Energy Efficiency and Solar Water Heating Loan Program
	Utility Loan Program	Carteret-Craven Electric Cooperative - Energy Conservation Loan Program
		Four-County EMC - Residential Energy Efficiency Loan Program
		Haywood EMC - Residential Heat Pump and Weatherization Loan Program
		Lumbee River EMC - Residential Weatherization Loan Program
		Piedmont EMC - Residential Energy Efficiency Loan Program
		Progress Energy Carolinas - Residential Energy-Efficiency Loan Program
		Tideland EMC - Weatherization Loan Program
		TVA Partner Utilities - Energy Right Heat Pump Loan Program
		Union Power Cooperative - Residential Energy Efficient Heat Pump Loan Program
South Carolina	State Loan Program	ConserFund Loan Program
		South Carolina - Residential Energy-Efficient Appliance Rebate Program
	Utility Loan Program	Berkeley Electric Cooperative - Energy Advance Loan Program
		Blue Ridge Electric Cooperative - Heat Pump Loan Program
		Pee Dee Electric Cooperative - Energy Efficient Home Improvement Loan Program
		Progress Energy Carolinas - Residential Energy Efficiency Loan Program
		Santee Cooper - Good Cents Energy Efficiency Loan Program
		Santee Cooper - Renewable Energy Resource Loans
Tennessee	State Grant Program	Energy Efficient Schools Initiative – Grants
		Tennessee Clean Energy Technology Grant
	State Loan Program	Energy Efficient Schools Initiative – Loans
		Local Government Energy Loan Program
		Small Business Energy Loan Program
	Utility Loan Program	Bristol Tennessee Electric Service - Energy Savings Loan

State	Program Type	Program Name
		Program
		Gibson Electric Membership Corporation - Residential Energy Efficient Water Heater Loan Program
		TVA Partner Utilities - Energy Right Heat Pump Loan Program
Virginia	PACE Financing	Local Option - Clean Energy Financing
	State Loan Program	Commonwealth's Energy Leasing Program
	Utility Loan Program	TVA Partner Utilities - Energy Right Heat Pump Loan Program

Organization

Loan and grant policies can be instituted through local governments, utilities, non-profit agencies, and state loan programs. Among the Southeastern states, loan and grants vary by amount, administrative or equipment requirements, and applicable terms and conditions. Loans and grants can be applied to specific projects or general improvements. Program administration varies among states and can include State Departments of Economic and Community Development, Energy Offices, Utilities, federal power agencies like TVA, and DNR. Florida, Louisiana, Mississippi, North Carolina, Tennessee, and Virginia have all enacted legislation for one or more loan and grant programs.

Costs and Benefits

The costs of loan and grant policies vary depending on advancement and payback terms. Grant and loan programs typically range from $500 for a small specified project to $500,000 for more comprehensive improvements.

Benefits of loan and grant policies come in the form of both energy savings and monetary savings. Savings vary depending on the type of improvement made. Energy efficient technologies or renewable energy resources can be costly upfront but they are designed to reduce energy use and save money over time. Loan and grant programs provide assistance to help offset the initial cost of implementing these technologies.

In addition to reducing greenhouse gas emissions, one of the primary benefits of loan and grant programs is to provide funding assistance to improve energy efficiency or implement renewable technologies. PACE financing is expanding however there are few examples in place in the Southeast.

Conclusion

Loan and grant programs provide monetary advancement for investment in energy improvements. Utility loans for renewable energy and energy efficient equipment are more prevalent than other loan and grant programs. Most states in the Southeast employ a combination of three different loan and grant policies described above. The state loan and utility loan programs are the most popular among all states in the region.

PROGRAM HIGHLIGHTS:

11 STATES IN THE SOUTHEAST HAVE FINANCIAL INCENTIVE POLICIES TO PROMOTE ENERGY EFFICIENT EQUIPMENT AND RENEWABLE ENERGY TECHNOLOGY

37 TOTAL PROGRAMS

PRODUCTION INCENTIVE POLICIES: ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, SOUTH CAROLINA, TENNESSEE, VIRGINIA

PROPERTY TAX INCENTIVE POLICIES: LOUISIANA, NORTH CAROLINA, TENNESSEE, VIRGINIA, WEST VIRGINIA

SALES TAX INCENTIVE POLICIES: FLORIDA, GEORGIA, KENTUCKY, NORTH CAROLINA, SOUTH CAROLINA, VIRGINIA, WEST VIRGINIA

OTHER INCENTIVE POLICIES: FLORIDA, GEORGIA

CAPITAL, EQUIPMENT, AND PROPERTY INCENTIVES

Capital equipment and production incentives are used to promote investment of renewable energy equipment and select energy efficient installations. Current financial incentives can be applied to new equipment installation, electricity generation, research and development, and retrofit or equipment improvement. These equipment and production incentive policies include a various sales and property tax exemptions for installation and retrofits, and production-based incentives for residential and commercial electricity generation. Financial incentives promote renewable energy technologies and equipment; primarily solar, biomass, wind, landfill gas, geothermal, and hydroelectric. In homes and commercial buildings, common energy efficient equipment includes washers and dryers, lighting, heating and air, doors, windows, and energy efficient manufacturing equipment. Capital equipment and production incentives can be applied to all sectors, but are mainly used in the residential and commercial sectors, followed by the industrial, utility, and agriculture sectors. The objective of these policies is to increase installation of energy efficient and renewable systems to reduce use of conventional energy sources. Property and sales tax incentives are all passed through state legislation and administered by a local or state agency. Production incentives do not have associated legislation and are administered by the utility company offering the program.

Four types of capital equipment and production incentive policies include **1) Production incentives, 2) Property Tax incentives, 3) Sales Tax incentives, and 4) Other incentives.**

1. **Production incentive** policies address the rules and regulations for payment between utility companies and electricity generators (residential and commercial). Incentive amounts vary by state, program, size, and type of energy generation. Production incentives administered by TVA provide an initial payment of $1,000 plus $0.12kW/h above retail rate for solar generation and $0.03kW/h for other renewable energy technology. Other programs throughout the Southeast range from $0.03kW/h to $0.32kW/h depending on the type of energy produced and system capacity. Terms and conditions also vary by program. For example, program administrators determine renewable energy credit (REC) ownership, a sunset date for payment, eligibility and installation dates, and payment timeline (i.e., between five and 20 years). Policies do not have to be enacted through local or state legislature; however, some programs do have legislative authority. Exceptions include a Gainesville, Florida ordinance,

North Carolina and South Carolina legislation. A large number of production incentives across Southeastern states are administered by TVA. However, additional programs are administered by other utilities and agencies including Progress Energy Carolinas, NCGreen Power, Georgia Power, Orlando Utilities Commission, Gainesville Regional Utilities, and the South Carolina Energy Office (a collaborative program sponsored by Duke Energy Carolinas, Progress Energy Carolinas, South Carolina Electric & Gas Company, South Carolina Energy Office, and the South Carolina Office of Regulatory Staff).

2. **Property tax incentive** policies primarily encourage installation of solar and wind energy generating devices (such as solar space heat, solar water heat, solar thermal electric, and photovoltaic). Property tax policies are applied to all sectors, but are most commonly used in residential, commercial, and industrial areas. Incentive amounts vary by sector and program. Property tax incentives can be comprehensive and address an entire property (e.g., a percentage of total assessed property value) or apply to the purchase of energy efficient equipment (e.g., a percentage of appraised value of renewable energy devices). These policies also exempt renewable energy systems from property taxes. In fact, exemptions can also include all equipment directly applied to and exclusively used for the conversation of energy. Each property tax incentive policy has been enacted through a code or general statute by the state government. Property tax policies are administered by state level departments such as Departments of Revenue, Comptrollers of the Treasury, Departments of Taxation, Departments of Mines, Minerals, and Energy, and Divisions of Energy. In North Carolina, property tax incentive policies are administered by the North Carolina Solar Center.

3. **Sales tax incentives** apply to the installation of energy efficient equipment as well as the installation and research and development of renewable energy systems. Many sales and use tax incentives offer a 100% tax exemption; however, terms and conditions vary by state. Some incentives only allow for products that meet or exceed Energy Star, Environmental Protection Agency, or Department of Energy efficiency standards. Other conditions that affect incentive amounts include system capacity, type of renewable energy generation, total energy reduction, research and development goals, and date of purchase. For example, sales tax incentives can be included in a "tax holiday" in which certain items are not taxed if purchased during a designated window of time. Yet, other sales tax policies define eligible products that are never subject to taxes, regardless of the purchase date (for example, South Carolina offers tax exemption for all hydrogen fuel cell related technology and equipment). In all seven states that offer a sales tax incentive, the policy has been passed by its state legislature. Sales tax incentives are administered by Departments of Revenue, Offices of Energy Policy, Energy Offices, Departments of Taxation, and State Tax Departments.

4. **Other incentive policies** in the Southeast include the Lakeland Electric Solar Water Heating Program in Florida and the Georgia Green Loans Save and Sustain Program. Florida's Lakeland Electric program promotes the installation of renewable solar energy and provides financial savings for residential customers. Lakeland Electric owns, maintains, and installs solar water

heaters to residential customers. Participants pay only for hot water delivered to the faucet. The objective of this policy is reduce the customers overall energy costs. Lakeland Electric is the program administrator. DSIRE claims Lakeland Electric Solar Water Heating Program is different from other utilities across the U.S. that only offer a green power option for a premium.[49] Georgia's Green Loans Save and Sustain program receives funding from The American Recovery and Reinvestment Act of 2009 (ARRA). The program uses funding to subsidize energy audits and provide low-interest loans for energy efficient improvements (i.e., HVAC systems, insulation, and Energy Star appliances). Loan amounts range from $500 to $50,000. Terms and conditions include an interest rate approximately 1% below market rate and a maximum loan term is five years. This program is administered by Georgia Green Loans, a non-profit micro-lending agency.

Activities in the Southeast

There are 11 states in the Southeast that have financial incentives, and are included in the table below.

State	Program Type	Program Name	Summary
Alabama	Production Incentive	TVA Generation Partners Program	Production-based incentive for the commercial or residential installation of renewable generation systems (i.e., solar, wind, low-impact hydropower, and biomass).
Florida	Other Incentive	Lakeland Electric Solar Water Heating Program	Lakeland Electric installs solar water heaters on participating customers' homes.
	Production Incentive	Gainesville Regional Utilities Solar Feed-In-Tariff	Gainesville Regional Utilities purchases energy from qualified photovoltaic systems at a set rate for 20 years.
		Orlando Utilities Commission Pilot Solar Programs	Pilot Solar Program offers to purchase renewable energy credits from customers who install renewable energy systems (i.e., photovoltaic and solar thermal energy).
	Sales Tax Incentive	Renewable Energy Equipment Sales Tax Exemption	Sales and use tax refund to support commercial fueling through hydrogen fuels, biodiesel, and ethanol.
		Solar Energy Systems Equipment Sales Tax Exemption	Sales tax exemption on the equipment and hardware necessary for collecting, transferring, converting, storing or using solar energy.
Georgia	Other Incentive	Georgia Green Loans Save and Sustain	Program helps subsidize commercial energy audits and provides low-interest loans for energy efficient

[49] Source: DSIRE

State	Program Type	Program Name	Summary
		Program	improvements (i.e., HVAC systems, insulation, and Energy Star appliances).
	Production Incentive	Georgia Power Solar Buyback Program	Georgia Power purchases renewable energy from customers that generate power that is later sold to other customers.
		TVA Generation Partners Program	Production-based incentive for the commercial or residential installation of renewable generation systems (i.e., solar, wind, low-impact hydropower, and biomass).
	Sales Tax Incentive	Biomass Sales and Use Tax Exemption	Sales and use tax exemption for biomass materials used in the production of pellets, fuels, and energy (i.e., electricity, steam, or both electricity and steam).
		Four-Day Sales Tax Exemption for Energy-Efficient Products	Four-day tax exemption for energy efficient (i.e., Energy Star or Water Sense) residential appliances under $1,500 (i.e., lighting, doors, and windows).
Kentucky	Production Incentive	TVA Generation Partners Program	Production-based incentive for the commercial or residential installation of renewable generation systems (i.e., solar, wind, low-impact hydropower, and biomass).
	Sales Tax Incentive	Sales Tax Exemption for Large-Scale Renewable Energy Projects	Sales tax exemption for large-scale renewable energy projects provides incentives to commercial entities that build or renovate facilities that use renewable energy sources.
		Sales Tax Exemption for Manufacturing Facilities	Sales or use tax exemption allows manufacturers to apply for a refund for the amount tax paid to purchase new equipment or retrofit existing equipment with an efficient energy system.
Louisiana	Property Tax Incentive	Solar Energy System Exemption	Solar energy systems considered personal property are exempt from ad valorem taxation.
Mississippi	Production Incentive	TVA Generation Partners Program	Production-based incentive for the commercial or residential installation of renewable generation systems (i.e., solar, wind, low-impact hydropower, and biomass).
North	Production	NC GreenPower	Production based payments for renewable energy generation (i.e., solar, wind, small hydro, and

State	Program Type	Program Name	Summary
Carolina	Incentive	Production Incentive	biomass).
		Progress Energy Carolinas SunSense Commercial PV Incentive Program	Production based incentive for commercial customers to generate and sell energy from photovoltaic systems.
		Progress Energy Carolinas SunSense Commercial Solar Water Heating Incentive Program	Progress Energy Carolinas purchases renewable energy credits from non-residential customers who install solar water heating systems.
		TVA Generation Partners Program	Production-based incentive for the commercial or residential installation of renewable generation systems (i.e., solar, wind, low-impact hydropower, and biomass).
	Property Tax Incentive	Active Solar Heating and Cooling Systems Exemption	Solar heating and cooling systems are not to be assessed at a value higher than a conventional system for property tax purposes.
		Property Tax Abatement for Solar Electric Systems	Property tax exemption of 80% of the appraised value of a photovoltaic system.
	Sales Tax Incentive	Sales Tax Holiday for Energy-Efficient Appliances	Sales tax holiday applicable to certain Energy Star-certified equipment.
South Carolina	Production Incentive	Biomass Energy Production Incentive	Production incentives for certain biomass-energy facilities.
		Palmetto Clean Energy (PaCE) Program	Premium payments for electricity generated renewable energy sources (i.e., solar, wind, biomass, geothermal, and small-scale hydropower systems).
		Progress Energy Carolinas SunSense Commercial PV Incentive Program	Production based incentive for commercial customers to generate and sell energy from photovoltaic systems.
		Progress Energy Carolinas SunSense Commercial Solar	Production based incentive for commercial customers to install solar water heating systems.

State	Program Type	Program Name	Summary
		Water Heating Incentive Program	
	Sales Tax Incentive	Sales Tax Cap on Energy Efficient Manufactured Homes	Sales tax cap on manufactured homes if they meet or exceed specified energy standards.
		Sales Tax Exemption for Hydrogen Fuel Cells	Sales tax exemption for equipment related to research and development of hydrogen fuel cells, including equipment to generate, produce, or distribute hydrogen fuel cells.
Tennessee	Production Incentive	TVA Generation Partners Program	Production-based incentive for the commercial or residential installation of renewable generation systems (i.e., solar, wind, low-impact hydropower, and biomass).
	Property Tax Incentive	Wind Energy Systems Exemption	Tax exemption for wind energy systems operated by public utilities, businesses or industrial facilities.
Virginia	Production Incentive	TVA Generation Partners Program	Production-based incentive for the commercial or residential installation of renewable generation systems (i.e., solar, wind, low-impact hydropower, and biomass).
	Property Tax Incentive	Local Option Property Tax Assessment for Energy Efficient Buildings	Property tax of energy efficient buildings is assessed at a reduced rate.
		Local Option Property Tax Exemption for Solar	Exemption or partial exemption of solar energy equipment or recycling equipment from residential, commercial, or industrial property taxes.
	Sales Tax Incentive	Sales Tax Exemption for Energy-Efficient Products	Four-day sales tax exemption on Energy Star products of $2,500 or less.
West Virginia	Property Tax Incentive	Special Assessment for Wind Energy Systems	Property tax assessments on utility-owned wind generators have a value equal to their salvage value.
	Sales Tax Incentive	Sales Tax Exemption for Energy-Efficient Products	Sales tax holiday on Energy Star Products of $5,000 or less.

Organization

A majority of capital equipment and production incentives in the Southeast, especially the property tax and sales tax incentives, have been enacted by state legislation. TVA's Generation Partners Program is a production-based policy that does not have any related legislation, as it is offered and administered by the utility. Florida's Lakeland Electric utility also administers the solar water heating program.

Costs and Benefits

Costs of capital equipment and production incentive programs can include administrative, monitoring and enforcement (i.e., date of equipment purchase or installation, following interconnection and net metering standards), supporting technology costs, and opportunity costs. All programs have some combination of these factors that determine how costs vary. For example, sales tax and property tax incentives enacted by legislation can be expensive and time consuming for government. The paperwork necessary for property tax abatements or sales tax exemptions can also be time intensive for applicants. Supporting technology costs for renewable and energy efficient systems vary depending on the type of energy. Production incentives require net metering and interconnection standards which can be costly to install or upgrade. In addition, the opportunity cost (defined as the cost of foregoing an alternative opportunity,) of sales and property taxes depends on the number of individuals that participate in the exemption or abatement. The more individuals that participate in these programs, the less revenue generated for municipal and state functions.[50]

The benefits of capital equipment and production incentive programs can also differ between types of renewable or energy efficient technology promoted. In general, these policies support the installation and research and development of renewable generating systems. Participation in these programs saves the consumer money and reduces dependence on conventional energy. Sales property tax exemptions reduce total capital cost of equipment for renewable and energy efficient systems. Production incentive participants are rewarded with energy credits or monetary payments for generating renewable energy. Renewable generation can reduce a home or commercial establishment's use of conventional energy. Results may be immediate as electricity generation can replace conventional energy use, and depends on type of renewable energy generated.

Conclusion

Capital equipment and production incentive policies are found in a variety of forms. These policies provide credit for energy generation, eliminate or reduce property and sales tax, and allow for a "tax holiday", where eligible equipment can be purchased during a select time period with no taxes. Across the United States, these tax policies are more prevalent for renewable energy systems than energy efficient systems. Yet, in the Southeast, there are more production-based incentives focused on renewable energy generation in place than sales tax or property tax incentives.

[50] Lann, R., and Riall, W. (1999) LOCI: A Tool for Local Fiscal and Economic Impact Analysis. Economic Development Review. Vol 16. No. 3. Pp. 27-34

PROGRAM HIGHLIGHTS:

9 STATES IN THE SOUTHEAST HAVE TRANSPORTATION-RELATED INITIATIVES

ALTERNATIVE FUEL POLICIES: ALABAMA, ARKANSAS, LOUISIANA, NORTH CAROLINA, AND TENNESSEE

FLEET VEHICLE POLICIES: ALABAMA, MISSISSIPPI, TENNESSEE, AND NORTH CAROLINA

PUBLIC TRANSPORTATION POLICIES: ALABAMA, GEORGIA, VIRGINIA

TAX CREDIT AND EXEMPTION POLICIES: ALABAMA, ARKANSAS, VIRGINIA

TRAFFIC COORDINATION POLICIES: NORTH CAROLINA

TRANSPORTATION

According to the U.S. Department of Energy (DOE), energy use associated with transportation is expected to increase 48 percent between 2003 and 2025, despite modest improvements in the efficiency of vehicle engines. This projected rise in energy consumption closely mirrors the expected growth in transportation GHG emissions.[51] In addition, transportation's petroleum use grew by 23 percent from 1990 to 2003, and accounted for 93 percent of the increase in total U.S. petroleum consumption over this period.[52]

In the effort to create meaningful transportation policy, states have a constrained role. At the federal level, transportation policy is created using broad regulations such as the Corporate Average Fuel Economy (CAFE) standards, intended to improve fuel economy of cars and trucks sold in the U.S. The federal role also extends to automobile manufacturers and the petroleum industry, where the federal government can promote various forms of alternative energy, such as ethanol-gasoline mixtures, and set other renewable fuel standards. States share powers with federal and local governments in transportation policy, with their energy-related activities centering on, for example, general provisions of public utility and public transportation matters.[53]

Recent transportation legislation in the clean energy sector has created new standards, enhanced existing standards, or clarified language related to low-carbon fuel technology. Low-carbon fuels include biofuels such as ethanol and biodiesel, as well as alternative fuels such as electric, compressed natural gas. Incentives to encourage the use of these fuels are primarily directed toward private and state-owned (fleet) vehicles, the agriculture industry, and have even extended to private businesses – from fuel suppliers to restaurant owners.

Major activities in the transportation sector include increasing the variety of materials that can be used to create alternative fuels, requiring fleets to use low-carbon fuel, increasing tax exemptions for the use of low-carbon technology, or allowing drivers the use of the High Occupancy Vehicle (HOV) lane regardless of the number of passengers.

[51] U.S. Energy Information Administration, *Annual Energy Outlook 2005 with Projections to 2025,* Table A2. U.S. Department of Energy, Energy Information Administration, Washington, DC.

[52] US EPA. Office of Transportation and Air Quality. *Greenhouse Gas Emissions from the U.S. Transportation Sector (1990 - 2003)*. Fairfax: ICF Consulting, Mar. 2006. Page 6.

[53] Note that this summary is limited to *state* policies in the Southeast that were initiated in 2009 (source: 2009 SSEB Legislative Digest). Transportation policies at the federal level were not identified as part of this project.

There are five types of clean transportation policies found in state legislation in the Southeast: (1) **Alternative Fuel, (2) Fleet Vehicles, (3) Public Transportation, (4) Tax Credit and Exemptions,** and **(5) Traffic Coordination.**

1. **Alternative Fuel** policies are by far the most widely adopted policies in the Southeast. These policies promote the use of low-carbon technology through new studies, infrastructure, and products. Alternative fuel incentives have extended beyond state-purchased fleet vehicles to the private sector in some states; encouraging restaurant owners to provide their waste fats, oils, and grease to biodiesel manufacturers. Other states have passed legislation specifically designed to increase the number of clean burning cars on the roads using new low-carbon fueling infrastructure, or by requiring refiners and suppliers to make gasoline and diesel that could be blended with ethanol or other biological products.

2. **Fleet Vehicle** policies generally require that state governments give preference to the purchase of new vehicles with a certain fuel economy standard established by the state. Several policies encourage the use of biodiesel (of a pre-determined minimum blend) in their fleets. Effectiveness in some states is measured through the purchasing authority.

3. **Public Transportation** policies are sparse in the Southeast. Primarily, these policies either create Public Transportation Commissions to establish a public transportation platform, or apply clarification to rideshare programs.

4. **Tax Credit and Exemption** policies apply to certain government-owned vehicles and the use of biomass for the production of biofuels.

5. **Traffic Coordination** policies are aimed at alleviating traffic congestion. North Carolina requires the Department of Transportation (DOT) and any municipality or Metropolitan Planning Organization (MPO) to jointly develop and implement a comprehensive traffic control plan that coordinates traffic signals to minimize vehicle idle time and promote the efficient flow of traffic through the municipalities.

Activities in the Southeast:

In 2009, nine states in the Southeast region enacted some form of Transportation policy.[54] The following table illustrates the types of programs in the Southeast related to transportation and low-carbon fuel technology:

State	Program/Policy Type	Summary
Alabama	Alternative Fuels	• Exceptions for alcohols used in the manufacture of an alternative fuel source for motor vehicles (HB 186: Ethyl Alcohol) • Urges public school systems to use 20 percent biodiesel in diesel-powered school buses (SJR 14: Biodiesel) • Requests actions to increase use of alternative fuels, flex-fueled vehicles and hybrid vehicles (SJR 16: Alternative Fuels)
Arkansas	Fleets	• Encourages the use of at least five percent (B5) biodiesel in diesel-powered vehicles operated by the state (SJR 15: Biodiesel) • Creates committee to ensure compliance with fleet fuel economy standards (HB 185: Green Fleets Review Committee)
	Public Transportation	• Creates Public Transit Commission to determine how public transit systems can be established and funded (HJR 592: Public Transportation)
	Tax Credit & Exemption	• Exempts volunteer fire departments and fire protection districts from all state and local motor fuel taxes (HB 519: Fuel Tax Exemption)
	Alternative Fuels	• Increases the incentive from $50,000 to $300,000 or 50 percent of the project cost, whichever is less, for any alternative fuels distributor per alternative fuels distributor site per fiscal year
Georgia	Tax Credit & Exemption	• Exempts biomass from being subject to a severance tax
	Public Transportation	• Clarifies “exempt rideshare” under HB 440
Kentucky	Alternative Fuels	• Clarifies definitions under HB 21: Motor Vehicles
Louisiana	Alternative Fuels	• Encourages restaurants to provide their used oil to biodiesel. • Requires the DOT to conduct a pilot study on alternative truck-trailer configurations to support the bio-fuels industry
Mississippi	Tax Credit & Exemption	• Provides an incentive to persons or corporations to invest in qualified clean-burning motor vehicle fuel property.
	Fleets	• Requires the Bureau of Fleet Management to prepare a fiscal analysis of the cost effectiveness of using alternative fuel or energy source vehicles by state agencies
North Carolina	Alternative Fuels	• Defines “biodiesel” for the Energy Credit Banking and Selling Program
Tennessee	Fleets	• Increases the purchase of biodiesel fuel to a minimum blend of B-20 for use in diesel engine school buses

[54] 2009 SSEB Legislative Digest

		• Requires the Department of Administration to give preference to new vehicles that have a fuel economy in the top 15 percent of that class of comparable automobiles
	Tax Credit & Exemption	• Creates tax credits for alternative fuel infrastructure, alternative fuel vehicles and advanced technology vehicles
	Traffic Coordination	• Requires the DOT and any municipality or MPO to develop and implement a comprehensive traffic control plan
	Alternative Fuels	• Authorizes utility districts to own and operate natural gas vehicle fueling stations • Requires all suppliers to make all grades of gasoline and diesel that may be blended with ethanol or other biological products available for sale by retailers
Virginia	Fleets	• Enacts the Tennessee Clean Energy Futures Act
	Tax Credit & Exemption	• Exempts any alternative fuel produced by the owner or lessee of an agricultural operation and used exclusively for farm use from the alternative fuel tax • Adds motor vehicles powered solely by electricity as a separate class of property for local taxation rates • Extends weight limit for motor vehicles using an auxiliary power unit or other form of idle reduction technology by an additional 400 pounds
	Public Transportation	• Extends the "sunset" provision allowing vehicles bearing clean special fuel license plates to use HOV lanes regardless of the number of passengers

Organization

Transportation incentives in the clean energy sector can be instituted through state or local governments, utilities, manufacturers, school systems, private corporations, and the public sector. Program administration varies among states and can include State Departments of Energy, Transportation, or Administration (i.e., the state's purchasing body). The majority of states in the Southeast have enacted some form of transportation-related legislation, with the exception of Florida, South Carolina and West Virginia. With six new programs in 2009, North Carolina is by far the most active state in the Southeast in terms of *enacting* transportation legislation related to clean energy and low-carbon technology. Tennessee follows close behind, enacting several pieces of *enforceable* legislation in 2009.

Costs and Benefits

The impact of high-carbon fuels on the transportation sector (including passenger, air, and freight) accounts for about 27% of the total U.S. GHG emissions, with the majority of the emissions from the combustion of fossil fuels.[55] The primary challenge that states face in the attempt to reduce GHG's is how to concurrently maintain economic growth. The cost to states of implementing low-carbon fuel

[55] US EPA. Office of Transportation and Air Quality. *Greenhouse Gas Emissions from the U.S. Transportation Sector (1990 - 2003)*. Fairfax: ICF Consulting, Mar. 2006.

technology may include the continued dependence on foreign oil, conversion of traditional fleets to low-carbon/low-emission fleet vehicles, and building the infrastructure (e.g., constructing and supplying new fueling stations) to support the conversion.

While higher gas taxes are an incentive to reduce overall vehicle miles traveled and increase fuel economy, tax increases generally face strong public opposition. Further, gasoline prices are market-driven and may be less effective than a manufacturer's standard set by regulation. Other low-cost options available to states include efficient land use and transportation planning, and channeling state transportation funds to finance less GHG-intensive activities, such as setting state emissions reduction targets.

Outside of the Southeast region, New York is one example of how costs can be mitigated at the state level. New York has developed recommendations for a "feebate" program: one that provides an incentive to manufacturers to make and buy fuel-efficient vehicles, and charge a premium on lower fuel economy vehicles. Theoretically, fees pay for the rebates, so no net revenue or cost is incurred by the government. New York's report shows that the cost/benefit ratio for passenger vehicles was highest in the feebate program.[56] The majority of the fuel savings from feebates came from the adoption of fuel-efficient technology by manufacturers; thus strengthening the argument and potential financial feasibility for advanced low-carbon technology.[57] Given the potential cost savings to manufacturers, the effect of the feebate program could be much higher with large fleets, rather than single passenger vehicle purchases.

Conclusion

The Southeast has made respectable strides with alternative energy development policy in the transportation sector. While many Southeast states are just getting started on the creation of new enabling legislation for low-carbon technology or establishing their standards, many states outside of the Southeast are well on their way to working with manufacturers and their Metropolitan Planning Organizations (MPOs) to create policy that will reduce GHG emissions. The Southeast should adopt less "loose" regulation and spend its resources on developing more enforceable standards.

[56] New York Department of Transportation. Center for Climate Change and Environmental Forecasting. *Estimating Transportation-Related Greenhouse Gas Emissions and Energy Use in New York State*. Washington, D.C.: ICF Consulting, 18 Mar. 2005.

[57] Greene, David, Philip Patterson, Margaret Singh, and Jia Li. "Feebates, Rebates and Gas-guzzler Taxes: a Study Of Incentives for Increased Fuel Economy." *Energy Policy* 33 (2005): 757-75. Print.

SUMMARY OF GAPS

In this section, we summarize the number of state-driven energy policies to uncover gaps by state in the Southeast. Table 2.1 shows that some energy policy and program areas – such as Building Codes and Standards and Loan and Grant Programs – are found in all the states in the Southeast. Other areas – such as RPSs and EERSs– are not well represented in the Southeast. The other four policy areas have gaps in implementation in one or more Southeastern states. However, direct counts of policies only tell part of the story, because some of these policies are comprehensive while others lean toward the "voluntary/encourage" or "study/organize" (versus "implementation") end of the spectrum. Thus, there is likely to be scope for further activity in each of these energy policy areas in the Southeast.

Table 2.1. Energy-Related Policies in the Southeast Region									
Southeast State	Policy Type*								
	Building Codes & Standards	*Renewables & Net Metering*	*Tax Credits & Rebates*	*Renewable Portfolio Standards and Energy Efficiency Resource Standards*	*Loan & Grant Programs*	*Capital, Equipment, and Property Incentives*	*Transportation*	Total Policies per State	Percent of Region
Alabama	2		11		8	1	7	29	6%
Arkansas	2	2	15		6		3	28	6%
Florida	4	5	39	2	8	5		63	14%
Georgia	4	3	27		8	5	1	48	11%
Kentucky	3	3	26		7	3	1	43	10%
Louisiana	2	4	7		2	1	3	19	4%
Mississippi	1		10		5	1	1	18	4%
North Carolina	9	14	33	2	15	7	6	86	19%
South Carolina	2	4	19	1	8	6		40	9%
Tennessee	4	1	15		8	2	3	33	7%
Virginia	4	5	10	4	3	4	4	34	8%
West Virginia	1	2	1	1		2		7	2%
TOTAL	**38**	**43**	**213**	**10**	**78**	**37**	**29**	**448**	**100%**
Percent of TOTAL Policies	**8%**	**10%**	**48%**	**2%**	**17%**	**8%**	**6%**	**100%**	

*All data captured from the DSIRE database as of July 15, 2010 and, in the case of EERS, Wingate, op cit. Transportation legislation captured from the 2009 SSEB Legislative Digest *only*.

SECTION 3. ECONOMIC IMPACTS FROM GREEN ENERGY POLICIES AND PROGRAMS

In this section, we compare the economic development paradigms in Section 1 to the green policies from Section 2 to put forth some projections for the potential outcomes from enhanced adoption of green policies in the 12 Southeastern states under analysis. A first step in this analysis is to develop a crosswalk between green policies and the economic development paradigms, and Table 3 presents this crosswalk.

Not all of the green policies are easily classified into one of the three paradigms; for example regulatory policies and codes are difficult to classify. We have applied our best informed judgment, plus garnered input from leading academic experts in renewable, energy efficiency, and economic development research to place regulatory policies in the most appropriate paradigm for purposes of this effort. For example, energy tax credits were placed in the first paradigm because these policies have a conventional background and are often considered in industrial recruitment offerings, and building codes were placed in the second paradigm because of their analogy to standards adoption, which is a common area of adoption for existing industries.

Table 3.1. Energy-Focused Policies and Tools by Economic Development Typology

Paradigm 1	Paradigm 2	Paradigm 3
Financially-Oriented (Fiscal and Regulatory)	**Technical Assistance to Individuals and Companies**	**Connecting Industries and Regions**
ARRA monies directed toward energy investment	Energy Audits	Targeted green jobs programs/training
Energy tax credits	Venture Funds	Sustainable Communities (HUD)
Energy R&D	Entrepreneurship	GHG reduction measures
Energy tax abatements	R&D grants	Pollution Reduction and Investment (PRI)/Cap & Trade
Fleets/Transportation (government procurement)	Energy Star program	
	Building Codes and Standards/LEED	
	Renewable Portfolio Standards (RPS) and Energy Efficiency Resource Standards (EERS)	
	Transportation Fuel Standards (e.g., E85)	
	Renewables/Net Metering	

As the table suggests, tax credits and financial incentives to promote green energy are analogous to Paradigm 1 strategies. Indeed, some of these incentives are direct correlates, with at least three states passing legislation that offers tax credits to attract green job producing industries. We would expect

that the level of adoption of these types of policies across the Southeast to continue to be very high; either formally enshrined in legislation or informally adopted through practice by state and local economic developers. By analogy, the results will likely be that these policies will have a moderate impact on encouraging adoption of green technologies and techniques by select companies. However, there will be a cost to government revenues and ultimately services from this policy. This cost should be weighed against potential increases in revenues from these companies down the line, enhanced efficiencies in government services, or broader societal benefits, such as the reduction in air pollution and CO2 emissions.

Paradigm 2 green policies encourage existing industries or new startup firms to undertake green R&D. Some green policies work by providing direct support for R&D for solar, wind, biomass, efficiency, or other types of green approaches. Other green policies are concerned with ensuring support infrastructure for green R&D; including Renewable Portfolio Standards to encourage the market for green R&D enabled energy, or policies to ensure that green power has connectivity to existing energy or transportation infrastructure. Still others encourage the development of a market for green R&D enabled energy by way of the state or local government using its purchasing power as an "anchor tenant" to provide a sufficient mass of early market share. By analogy from Paradigm 2 green policies; these policies will have a significant impact on the companies that participate. Some of these policies will require a notable level of resources to form assistance mechanisms for helping companies with these green R&D approaches and with retooling and retrofitting existing structures and machinery for the green economy.

Aside from *federal* American Recovery and Reinvestment Act (ARRA) stimulus funding, our analysis has uncovered virtually no Paradigm 3 green policies in existence in our search of formal legislation among the 12 Southeastern states under analysis. There are several reasons for this lack of formal state-level legislation to put Paradigm 3 policies into place. First, some Paradigm 3 policies are locally developed and operated, thereby not requiring state level legislation. Second, some Paradigm 3 policies are local implementations of federal programs (such as those receiving stimulus support through ARRA), again not requiring state level legislation. Third, there are no central databases of Paradigm 3 policies that are relevant to the renewable and energy efficiency domain.

Under ARRA, over $200 billion has been awarded nationwide since February 2009. The DOE has $30 billion available, and $7 billion is available to the EPA.[58] To address this lack of information on Paradigm 3 green policy and program areas, we have conducted a synoptic search, which identified several Paradigm 3 initiatives. For example, a regional cluster of activities focused in Tennessee has emerged around a newly created solar resources cluster (funded through ARRA):

- **Volunteer State Solar Initiative** – Tennessee will use its SEP funds to establish the Volunteer State Solar Initiative, a comprehensive solar energy and economic development program, focusing on job creation, education, renewable power production, and technology commercialization. The initiative consists of two projects: The Tennessee Solar Institute at the

[58] Source: http://www.recovery.gov/Transparency/agency/reporting/agency_reporting1.aspx?agency_code=89

University of Tennessee (UT) and Oak Ridge National Laboratory (ORNL), which will focus on industry partnerships to improve the affordability and efficiency of solar products; and the West Tennessee Solar Farm, a five-megawatt 20-acre power generation facility in Haywood County that will be one of the largest installations in the Southeast and serve as a demonstration tool for education and economic development.[59]

- **The Tennessee Solar Institute** – The Tennessee Solar Institute at UT and ORNL will be a center for excellence to spur accelerated growth in Tennessee's burgeoning solar industry and serve as a crossroads for a wide-range of solar-related activities in the Volunteer State. The institute will bring together scientists, engineers and technical experts with business leaders, policymakers and industry workers to help speed the improvement and deployment of solar photovoltaic (PV) technology. Basic research activities will be conducted using state energy funds to be designated to UT and ORNL, outside of the Recovery Act. The institute will create a "Solar Opportunity Fund" to underwrite a series of new innovation and installation grants. Approximately $23.5 million in grants will be distributed to solar- industry firms looking to strengthen or expand their operations as well as businesses looking to install solar-energy generation systems.
- **The West Tennessee Solar Farm** – Tennessee will use its ARRA funds to establish the West Tennessee Solar Farm, a five-megawatt solar array in Haywood County, Tennessee. The Solar Farm will serve as a demonstration site for educational purposes for the public and students to learn about the benefits of renewable energy. It also will be a showcase for a range of commercially available solar techniques and technologies. This program will be primarily administered by UT. Under a preliminary agreement, the federal TVA will purchase power generated by the farm at a renewable energy price. The farm, to be located at a site along Interstate 40 near the Haywood County industrial megasite, will be Tennessee's largest solar installation and one of the largest in the Southeast. Demonstrating the zero-carbon production of electricity on a highly visible and significant scale is expected to encourage future renewable-energy interest and investments.

There are several networking organizations to foster green practices in the Southeast. Examples include the Southeastern Energy Efficiency Alliance, Southern Alliance for Clean Energy, Southface, Green Chamber of Commerce, the Southern States Energy Board, and Southern Growth Policies Board, among others. In addition, there are sustainable development practices across the Southeast. For example, the Atlanta Regional Commission has a "Green Communities Program" which assigns certifications to the cities in its 10-county region based on their adoption of green building, energy efficiency, green power, water efficiency, tree planting and greenscape, transportation and air quality, recycling and waste reduction, land use, education and outreach, and innovation practices.[60] No legislatively-designated regional innovation clusters were identified in this study for promoting green or sustainable development – albeit, an important area of future activity for the Southeast region to consider.

[59] National Association of State Energy Officials
[60] Atlanta Regional Commission. Oonline.: www.atlantaregional.com/greencommunities

PRIORITIES & RECOMMENDATIONS

Based on a review of established economic development programs and current energy related policies, we have developed a set of priorities and recommendations. These priorities and recommendations stem directly from the gaps noted in the analysis of renewable and efficiency policies and programs in the Southeast in section 2. In addition, we took findings from the economic development paradigms to place emphasis on programs and policy areas which had the potential to provide the highest benefits in terms of economic development outcomes in the Southeast.

These priorities are shown ranked in order, from highest to lowest priority, in Table 3.2 below.

Table 3.2. Priorities for Addressing Gaps in Energy-Related Policies

Policy Area Recommendation	Costs	Benefits	Priority
Energy-related Regional Industry Clusters	Institutional and networking environment required to foster energy-related industries; increased risk of becoming "overly specialized"	Savings to co-located cluster industries (economies of scale); encourages intra-cluster networking; more efficient use of a state's economic development resources; specialized labor pools	**High**
Commercialization of Emerging Renewables and Efficiency Technologies via Support to State SBIR Programs	Risk of emerging technologies (not all investments will pay off)	Fosters emerging industries through reduction of barriers to invest in R&D and think in terms of commercialization; continuous funding source	**High**
Technical Assistance in Net Metering & Interconnection Standards	Less tax revenue for exemptions and utility collects less revenue from consumer; up-front costs of utility meter retrofits; application to interconnect to grid	Administrative and accounting savings for utilities; electricity banked until needed by customer; decentralized energy sources	**High**
Technical Assistance to Encourage Adoption of Renewable Portfolio Standards, CHP, and other Efficiency	Investment in alternative energy sources and efficiency technologies; administrative costs in monitoring compliance; rate increases; potential adverse	Stimulation of innovation in the local market for renewables and efficiency technologies; performance incentives that the utility receives for meeting the	**High**

Table 3.2. Priorities for Addressing Gaps in Energy-Related Policies			
Policy Area Recommendation	**Costs**	**Benefits**	**Priority**
Technologies	reaction to regulatory approach	target varies	
Strengthen Transportation Policies	Many policies have voluntary orientation; continued dependence on foreign oil; conversion of traditional fleets to low-carbon/low-emission fleet vehicles; new infrastructure	Reduction of GHG emissions; fosters the investment and use of alternative fuel vehicles; government acts as the "anchor tenant	**Med-High**
PACE Financing Supplement (as a part of Loan and Grant Programs)	Up-front investment required to acquire new energy equipment and infrastructure; can take several years to reap savings; improvement tied to the property; dependent on communities to implement; details can be complex	Typically low-interest, long term financing for up-front investment; creates demand for renewable energy investments; potential to raise improved property value; lower energy bills and reduction of GHGs	**Med**
Adoption of Building Codes and Standards	Local adoption and enforcement; compliance with the relevant state energy code(s); costs of materials to build/retrofit	Greater low-cost opportunities to implement; less costly to operate; moderate payback periods	**Med**
Technical Assistance to Encourage Adoption of Energy Efficient Resource Standards*	Administrative costs in monitoring compliance; possible customer rate increases; potential adverse reaction to regulatory approach	Greater productivity in the utility and other relevant sectors; reduction of GHG emissions.	**Med**
Foster Adoption of Capital, Equipment, and Property Incentives	Administration, monitoring and enforcement; supporting technology, installation, upgrades, and opportunity costs	Installation and R&D of renewable generating systems; reduce a building's use of conventional energy; builds market for renewable and efficiency technologies	**Med**
Monitoring of Tax Credits and Rebates	Reduced revenues for the provision of government services;	Capital investment of energy saving technologies; reduce demand for non-renewable	**Low**

Table 3.2. Priorities for Addressing Gaps in Energy-Related Policies			
Policy Area Recommendation	**Costs**	**Benefits**	**Priority**
	administrative costs	energy; financial savings to the general population	
Monitoring of Loan and Grant Programs	Dependent on advancement and payback terms. Grant and loan programs can range from $500 for a small project to $500,000 for comprehensive improvements	Funding assistance to improve energy efficiency or implement renewable technologies	**Low**

**Except* for CHP and other Efficiency technologies

Explanation of Priority Ranking

"High Priority" policy areas are those where there is a significant regional need/gap, and which the Energy Foundation should focus its efforts first when looking to leverage clean energy policy in the Southeast. For example, there is a current lack of formal programs to promote regional innovation clusters in the energy domain in the Southeast. Processes to promote regional innovation clusters typically begin with a cluster analysis to identify the needs of the local economy. Gaps in cluster performance have the opportunity to be filled through efforts at the local, state, and federal levels. The Energy Foundation could play an important role by working with its partners at the state and local levels to stimulate regional energy related clusters. It should be noted that the Obama Administration's Innovation Initiative prioritizes regional innovation clusters through programs in multiple federal agencies including the Economic Development Administration, Department of Labor, National Science Foundation, and U.S. Department of Agriculture.

The SBIR program plays an important role in promoting renewable policies through fostering small business R&D and establishing new energy –related technologies. However, although SBIR awards are less prevalent in the Southeast, energy awards for SBIR are even weaker in this region. Although SBIR is a federal procurement program, states have developed infrastructure to assist small businesses with competing for these awards. Each state has its own infrastructure, meaning that the SBIR assistance function is resident within different programs and organizations depending on the state. In addition, some state SBIR assistance programs offer "Phase 0" matching funds to enhance the application, while others (albeit a smaller number) offer "Phase 3" funds to encourage commercialization. The Energy Foundation should work with these state programs to encourage more SBIR submissions. In addition a partnership with Oak Ridge National Laboratories, the only DOE national laboratory in the Southeast, could be fruitful for promoting SBIR energy-related activity.

More traditional regulatory programs, such as net metering and RPSs, need state support (in the form of legislation) to be successful. In such cases, the Energy Foundation could work with states and public utility commissions on traditional rule-making and policy implementation.

"Medium Priority" policy areas are those with which the Southeast has made some headway, but could benefit from moderate support from the Energy Foundation to develop comprehensive policy measures. For example, although PACE financing has been enacted through legislation in five states, (Florida, Georgia, Louisiana, North Carolina, and Virginia,) none of these programs is yet operational - due in part to a lack of clarity in the enabling state legislation, and the notion that voluntary participation may be weak in a soft housing market. Organizations such as the Southeast Energy Efficiency Alliance (SEEA) have worked with states to "iron out the kinks" in their PACE legislation to ensure that it doesn't conflict with state constitution, and make this tool an easier one to implement. Likewise, omnibus efficiency legislation such as EERS is only evident in three Southeastern states (enacted in Florida; voluntary in North Carolina and Virginia), although, certain voluntary standards (such as energy star appliances, LEED and other building codes) are widely used in the Southeast. This type of omnibus efficiency legislation could benefit from work with states and public utility commissions on traditional rule-making and policy implementation.

Finally, **"Low Priority"** policy areas are those which are already in abundance in the Southeast, and would require limited support by the Energy Foundation in the form of monitoring, or continued availability as a resource. In particular, tax incentives and loan and grant programs are extensive in Southeastern energy legislation and programs. Because these incentives and programs are commonly emphasized economic development tools in the region, the Energy Foundation should maintain monitoring and awareness of best practices of these programs.

Further discussion of the implementation strategies of clean energy policy from the perspective of stakeholder relationships is examined in the companion report, entitled "Southern Energy and Economic Development White Paper."

CONTACT INFORMATION

Leigh Hopkins, AICP
Project Manager
Georgia Tech Enterprise Innovation Institute
75 Fifth St. NW Suite 700
Atlanta, GA 30308
404-894-0933
leigh.hopkins@innovate.gatech.edu

Jan Youtie, Ph.D.
Manager, Policy Services, and Adjunct Associate Professor in Georgia Tech's School of Public Policy
Georgia Tech Enterprise Innovation Institute
75 Fifth St. NW Suite 700
Atlanta, GA 30308
404-894-6111
jan.youtie@innovate.gatech.edu

Nancy Galewski
Research Associate
Georgia Tech Enterprise Innovation Institute
75 Fifth St. NW Suite 700
Atlanta, GA 30308
404-385-2053
nancy.galewski@innovate.gatech.edu